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The Journal

OF

Nervous and Mental Disease

AN AMERICAN JOURNAL OF NEUROPSYCHIATRY

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The Journal

OF

Nervous and Mental Disease

An American Journal of Neuropsychiatry, Founded in 1874

ORIGINAL ARTICLES

"ANTIGRAVITY MUSCLES"

BY WALTER M. KRAUS, A.M., M.D.

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The application of the phrase "antigravity muscles" to certain extensor muscles which maintain certain animals in a standing position appears in an article by Sherrington in 1910 (1). His statement applied to decerebrated cats and dogs. He stated (p. 2): "The extensor muscles of all four limbs, the dorsal muscles of the back, neck, and tail, the retractors of the head, and the elevators of the lower jaw, are all in harmoniously coördinated steady tonic contraction." He continues (p. 3): "In the limbs they keep the limb from yielding under its own weight and under that of the body superimposed. In neck and head they keep those parts from falling; similarly in the tail they keep it from dropping, and in the head they keep the lower jaw in apposition to the upper, so that the mouth is closed.

"The muscles exhibiting the steady contraction executing this general reflex, although they are widely distributed in the body, compose nevertheless a homogeneous system. They all by their contraction contribute to one common result. They each and all, by contracting, *counteract gravity*¹ in the *ordinary erect position* usual to the animal, the *usustatus*²."

The term was therefore specifically applied to the *usustatus* or usual standing position of the cat and dog. With the use of the phrase in this manner I am entirely in accord. However, a number of authors (2) (myself included) (4) have since that time used

¹ Italics by W. M. K.

² Italics by C. S. S.

the term less precisely, without indicating the animal and that it was in its *usustatus*, so that it has come to mean a definite group of muscles, much as one would speak of the flexors or extensors, rather than a group of muscles active in certain animals under certain circumstances. A certain group of muscles is understood irrespective of the animal and its posture. Further, the word "*usustatus*" has not been added so that the phrase has come to suggest that these muscles counteract gravity *under all circumstances*, and that they are the only muscles which counteract gravity, which is not true. Furthermore, these muscles obviously have other functions which indicates that the label "*antigravity*" is too exclusive. Thus the original idea of Sherrington has been distorted.

In order to illustrate this, I shall consider three questions:

1. Whether in all animals these muscles are the only ones which counteract gravity and are hence deserving of the term "*antigravity muscles*" to the exclusion of other muscles.

2. Whether the corresponding opposite and antagonistic muscles are not equally "*antigravity muscles*" under certain conditions.

3. Whether these so-called "*antigravity muscles*" have not other functions equally important which are omitted by the application of the label "*antigravity*."

In reply to these first two questions, I would simply call attention to the sloth which hangs by its claws from the branches of trees, to certain lizards, to anteaters, squirrels, and opossums. These animals obviously counteract gravity by their limb and axis flexors at times, *i.e.*, are upside down. Furthermore, a circus acrobat hanging by his feet will use limb flexors, not extensors, to counteract gravity.

A term so important in its relation to posture and motility should obviously be applicable to all animals. Unless the term "*usustatus*" be used and the animal specified, the term will be often grossly incorrect. The *antigravity muscles* of the sloth are not those of the cat or dog, nor are those of an acrobat suspended by his feet those of his "*usustatus*."

The third question may be answered in the affirmative by simply realizing that these muscles are concerned in progression forward or backward as well as in counteracting gravity.

Now progression preceded the counteracting of gravity, for fish progress but do not have to counteract gravity. The dorsal as well as the ventral trunk musculature of fish have a quite definite function of producing progression. The counteracting of gravity appeared when terrestrial life appeared. Hence the *antigravity* function of the extensors of the trunk was secondary to its progression function. In the course of development, as Vallois(5) has pointed out, the

dorsal trunk muscles came to have the function of support and became attached to the vertebrae (urodeles), as is not the case in animals who use the muscles only for progression (fish). In the lower types of animals, as, for example, fish, the vertebral column acts as a spring which counteracts the curving action of the muscles; in other words, the vertebral column is opposed to the action of the trunk muscles. On the other hand, "pari passu" with the assumption by the limbs of the function of progression in tetrapodal land animals and the vertebral column of the function of support, the dorsal muscles become more and more firmly attached to the vertebrae (5) (p. 510). The vertebral column and dorsal axial muscles come to act dorsoventrally rather than laterally. However, in all animals, man included, these muscles retain some influence in the process of progression (5) (p. 490).

It is also true that the limb extensors are as active in man in progression as in the counteracting of gravity, for if the leg were not carried forward from the maximum of the flexion phase to the forward position normal progression could not take place.

A hemiplegic who cannot stand can swim, and a child who cannot walk can, if suspended in a bath, progress. The suspension band is merely put on to counteract the difference between the specific gravity of the child and that of water, a difference which is practically absent in fish. The idea that standing, counteracting gravity, preceded progression in man is not true. A child fails to walk, not because he cannot progress, but because he cannot stand; not because he cannot move from one place to another, but because walking demands not only the aquatic ability to progress but also the terrestrial ability to counteract gravity. As I have shown in my analysis of gait in man (6), there are four phases, two fin-like and residual of aquatic progression and consisting of the moving of the legs considered as rods forward and backward by corresponding opposite sets of muscles acting at the hips (first and second phase), and two other phases, terrestrial in character, by which one limb is lifted from terra firma by the flexion of the leg by a definite set of muscles (third phase), and the other is fixed to resist terra firma, and so gravity, by a correspondingly opposite set of muscles (fourth phase). Furthermore, not only are the extensors of the knee part of the anti-gravity group, concerned in straightening the leg after it has passed its maximum of flexion, as has been stated above, but they are also concerned in straightening the leg in the support phase. I have shown (6, 7) that in walking the knee is bent at the maximum phase of support and that it is extended in its maximum ventral or backward position, hence it is extended in passing from the support to

the ventral position as it exerts less and less antigravity activity. Whereas the knee extensors are concerned in counteracting gravity by straightening the leg, they are also concerned in progression by the same action. The angle at the knee, when counteracting gravity while standing and that while walking, is not the same (Holt phenomenon) (7). In standing, the knee extensors only act to counteract gravity, while in walking they do both this and form part of the muscle group active in progression.

As I have tried to show, progression both from the point of view of comparative anatomy, phylogeny, and from the point of view of the development of a man (child), ontogeny, preceded antigravity activity. Progression preceded the counteracting of gravity and is still an important function of the so-called "antigravity" limb muscles. Hence the muscles which counteract gravity have other functions.

As to the application of the term to the elevators of the jaws, it also tells but part of their functions, which include the seizure and mastication of food.

It were better to say, therefore, "the antigravity functions of the axial and appendicular extensors and the elevators of the jaws," firstly, because the muscles do not counteract gravity in all animals; secondly, because they do not always do so even in the same animal; and thirdly, because they are also concerned in a great many other acts equally important, such as progression. When the proper impulses set them in the proper position they counteract gravity, otherwise they do not. To speak of them as a group which counteracts gravity, to the exclusion of other groups and as if they always did that and never did anything else, is obviously incorrect.

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FUNCTION OF NEUROGLIAL TISSUE—FACTS AND THEORY

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Realizing the advantages to be derived from analytic interpretation and coördination of scientific facts resulting from physiological, pathological and clinical observation, together with research work of many histopathologists, the writer has attempted to inquire into the true function of neuroglia tissue with the view of reopening a subject worthy of voluminous discussion.

While most authors agree and teach that neuroglia tissue functions solely as sustentacular or connective tissue, there are many facts of interest which do not harmonize with this view that are worthy of careful scrutiny, and will now be considered.

The entire nervous system is developed from the ectoderm of the embryo. The cellular elements of the brain and spinal cord are composed of neurons and neuroglia both originating from this layer, while the membranes and blood vascular system originate from the mesoderm. (1) At a very early stage in development neuroglia appear as nucleated radial masses of protoplasm called spongioblasts which finally differentiate into irregular branching neuroglia cells. Somewhat later, fibers appear springing from the spongioblastic elements of the neural tube and become an integral part of the neuroglia cell, but differ chemically in their staining reaction from the remainder of the cell. Two questions may well be asked at this point. If neuroglia is solely sustentacular in nature why does it not originate as do other connective tissues from the mesoblast? And, secondly, why do neuroglia fibers in the embryo possess different staining qualities from that of its cell as differentiated from similar staining properties of connective tissue cells and fibers in all other regions?

The arterial circulation within the substance of the basal ganglia is essentially a terminal one, and although the cortical vessels do anastomose with each other, the collateral circulation in the event of occlusion of a branch artery is insufficient to reestablish normal blood

supply. Why does not nature provide as liberally for collateral circulation in the brain as it does elsewhere in the body?

Anatomists uniformly agree that neuroglia consists of cell bodies and fibers enmeshing neurons, and they are in closest proximity both to the blood-lymph supply and with the neurons and their processes. Andriezen, (2) as well as others, has clearly depicted expanded conical disc-like attachments of protoplasmic neuroglia fibers to blood vessels. These disc-like attachments will be later described more in detail as perivascular feet.

Gray (3) states, that "some of the neuroglia fibers start from the epithelial cells lining the ventricles of the brain and central canal of the medulla spinalis and pass through the nervous tissue branching repeatedly to end in slight enlargements on the pia mater."

Rubaschkin (4) informs us that, "In the immediate vicinity of the neurons, the feltwork-like fibrilla of neuroglia tissue is unusually close so that the nerve cell bodies and roots of the processes are surrounded by a protecting sheath, the glia capsule. This diminishes along the dendrites, and after these begin to branch, the neuroglia no longer forms a complete special investment. The medullated nerve fibers within the brain and spinal cord are also provided with delicate neuroglial sheaths which replace the neurilemma which on these fibers is wanting. These sheaths are prolonged for some distance on the fibers of the roots of the spinal nerves. The fibers of the optic nerve and the olfactory tract are accompanied throughout their length by neuroglial sheaths, those of the remaining cranial nerves losing their envelopes shortly after leaving the brain."

"Beneath the pia mater the neuroglia is especially dense and forms the external subpial layer that everywhere invests the nervous mass following all the inequalities of its surface, excluding the pia mater, except where its connective tissue strands accompany the blood vessels into the nervous mass. The subpial layer consists of a dense feltwork of glia fibers disposed in various planes which are partly free and partly the processes of spider cells. Internally the layer fades into adjoining diffuse neuroglia without demarcation. At the periphery, the fibers often exhibit a radial disposition; their outer ends usually being somewhat expanded. Within the white matter the neuroglia, both in distribution and density, is fairly uniform, although special tracts often separate the larger bundles of nerve fibers, but its arrangement within the gray matter presents less uniformity, since more or less marked condensations occur where the

nerve cells are collected into nuclei as conspicuously seen in the inferior olive."

Piersol (5) states that, "The substantia gelatinosa Rolandi is relatively poor in neuroglia elements as demonstrated by the newer stains of Golgi silver impregnation method. In general, the feltwork of the neuroglia fibril is more compact in the gray than that permeating the white matter, being somewhat denser at the periphery than in the deeper parts of the gray matter. Numerous glia fibrils extend outward from the framework of the gray matter to be lost between the nerve fibers of the adjoining columns. This feature is marked the anterior horn where the glia fibrils form septa of considerable thickness that diverge into the surrounding columns; further, the conspicuous processes of the formatio reticularis and the projecting lateral horn consist largely of neuroglia. The large nerve cells and their robust processes are ensheathed by interlacements of neuroglia fibrillæ. In the several parts of one posterior horn the amount of neuroglia varies; thus the apex consists almost exclusively of glia tissue, while within the Rolandic substance the number of glia fibers and cells is unusually small; within the caput and remaining parts of the posterior horn the neuroglial elements are similar in quantity and disposition to those in the anterior horn."

Andriezen (6) in his elaborate histological study of neuroglial tissues depicts very clearly an exceedingly fine system of canaliculi and lymph spaces surrounding the body and dendritic processes of protoplasmic glia-cells which is directly continuous with the perivascular lymph spaces. In a diagram of the cerebral meninges and cortex, Tuke shows plainly that the perivascular lymph spaces are intimately surrounded by the neuroglia cells.

Most histologists concur in that the posterior pituitary body is composed of special and highly differentiated neuroglia cells, many of which have been traced to the tubercinereum on the floor of the third ventricle, others to the optic chiasm, and as the floor of the third ventricle and optic chiasm are intimately connected by numerous important nerve bundles with the cerebrum and base of the brain, the significance of a highly specialized secretion from this neuroglial tissue thrown into the ventricle at this point becomes evident in view of the experiments of Cushing and Goetz, and also Dixon of the Pharmacological laboratory at Cambridge, who demonstrated the active principle of posterior lobe secretion within the cerebrospinal fluid by well known experiments.

The pineal body, with the exception of a few nerve filaments in

the anterior part and a dense network of neuroglia fibers in the under-part, contains no elements of a nervous character, nerve cells being absent.

From this brief anatomical review we can readily see that the markedly irregular distribution of neuroglia throughout various parts of the brain, spinal cord and cranial nerves; the formation of special tracts, their density in certain regions, rarity in others, their peculiar increase numerically in the gray matter, in the posterior pituitary and pineal bodies, posterior horn and central canal of the cord, as compared with other parts of the central nervous system, seems to be far from ideal in nature's scheme to harmonize with the view that neuroglia tissue is purely sustentacular.

Golgi has shown that a veritable forest of dendrites from the deeper neurons pass out toward the surface of the cerebrum and cerebellum and the dendrites of the spinal cord run out toward the periphery. This is where the feltwork of neuroglia fibrils are most numerous and it appears that here particularly, anasthamotic channels are situated for the transmission of necessary nutriment from the neuroglia to the neuron.

Barker states that, while the direct attachment of many of the processes of glia cells to the walls of blood vessels appears to have been definitely proven, there is no evidence at all that any such arrangement commonly exists for dendrites of the nerve cells.

In his monumental work upon the histophysiology of neuroglia Cajal (7) comes to the following conclusions:

1. The protoplasmic astrocyte has a structure recalling that of glandular cells. In the midst of a dense spongionoplasm, gliosomes or differentiated granules lie; their number, size and staining reactions vary according to functional states.

2. Every astrocyte of both gray and white substance is provided with a suction tube or perivascular foot; this is delicate in the protoplasmatic and robust in the fibrous astrocyte.

3. All astrocytes of both man and beasts possess a centrosome.

4. During the epoch of evolution astrocytes are capable of phenomena of migration and expansional transformation which are similar to the amoeboid movements of leucocytes. In this way vascular feet are formed which sometimes are the result of a new expansion.

5. The Ranvier-Weigert fibers result from the ultraprotoplasmatic differentiation of the astrocytes. In no case do the fibers completely free themselves from the glial protoplasm.

6. The human cortex differs from that of animals, not only in the enormous quantity of the glandular type of cells it contains, but also in their small size, the great richness of the interstitial glial plexus and the absence of any tendency in the glandular type of glia to differentiate intraprotoplasmatic fibers in normal conditions.

Fananas (8) also concludes from his studies of neuroglia:

1. That the molecular layers of the cerebellum contain autonomous astrocytes, Bergman's fibers and prolongation from cells in the granular layer. Most astrocytes of the perivascular type insert at least one expansion on a vessel; they contain many gliosomes.

2. About the Purkinje cells, both fibrous and protoplasmic astrocytes are found; also certain cells applied to the neuronie dendrites which may serve as insulators.

3. Adendritic cells are frequent in all parts.

4. The protoplasmatic cells contain gliosomes.

Tilney (9) and Riley point out like Cajal and Bechterew that the typical nerve cell of most vertebrates has no centrosome, which explains the absence of reproduction and repair of cells of the central nervous system. In the neuroglia cells, however, a centrosome can regularly be observed, and these cells have a high degree of reproductive power.

Achucarro (10) emphasizes the importance of the theory of the endocrinic activity of neuroglia and the prominent position which the glial foot attains in the elucidation of this theory, the foot occupying the position of secretory and excretory organ at one and the same time. The development and histologic conditions of the feet therefore may serve as an index of the sanguineal-glandular function of neuroglia. This author reviews the work on the ontogenesis of the glial foot, naming Held, Rubaschkin, da Fano and especially Cajal who, in a late work, has shown that as soon as vessels appear in the central nervous system, glial feet are seen to be formed at the expense of the peripheral prolongations of epithelial neuroglia, or sometimes at the expense of collateral branches of the peripheral prolongations mentioned. He also draws attention to his work in Ammons' horn where he has stated the attraction evidently exercised by the vascular system on the glial protoplasm, resulting in the formation of feet, are manifest not merely on the entrance of the vessels into the nervous structure, but also later, when the vascular system is completely organized.

In the birds studied, the relations of glia and vessels are very close and the glia is autonomous. The glial feet are attached to a large

part of the vascular surface and form a complete sheath about the vessels. The feet and the sheath present a finely reticulated and vacuolated structure showing that they are not merely for support, but are functional in character.

The distinction between the protoplasmic and fibrous glial cells is most important, for the researches of Achucarro and Cajal show that the persistence in adult age of protoplasmatic cells is a characteristic correlative with the progressive development of the cerebral cortex in the animals series.

Achucarro (11) in an earlier work states that the functions of the neuroglia are multiple—they assist in breaking down nerve tissue (Alzheimer, Jacob, etc.), in forming scar tissue and act as a support in the fibrous stage. They also act as insulators for the nerve tissues and probably have a secretory function. This secretion may be in relation to the functioning of the nervous system on the one hand, and in relation to the vessels on the other, constituting an internal secretion.

Rio-Hortega (12) describes a third form of neuroglial cells which he calls microglia. These are shown in profuse and excellent illustrations which appear conclusive. These microglia are defined as consisting of a very small corpuscle provided with large ramified expansions; they are diffused throughout the nervous system and especially prominent in the gray matter. These cells are seen as satellites of the vascular, other neurological and nervous tissues, although differing from protoplasmic neuroglia in not having direct connection with blood vessels. They also differ from the other two types of neuroglial elements in that they have neither gliosomes nor gliafibrils in their obscurely reticulated protoplasm, but pigment and lipoid granules are frequently seen in its substance. Judging from its action in pathological conditions, microglia are especially fitted for phagocytic action on the degenerative products of disintegrating nerve cells during which the form of these microglia are modified little by little and transformed in rod cells and granuloadipose cells.

Noda Kioto made a special study of Nissl's Staebchen cells which are described as glia-like cells and he found them in profusion in cases of general paresis, meningo-encephalitis, glioma, epilepsy, delirium tremens, and senile dementia. He contends that these cells have a certain pathological relationship to these as well as other pathologic alterations in the central nervous system and specially to the alterations in mesodermal and ectodermal elements. Staebchen cells have a multiple genesis, some from mesodermal cells, others

from glia cells. Some Staebchen cells occasionally emigrate from the pia to the cortex, at least that was shown in a case of tuberculous meningo-encephalitis.

Kyoyasu Marui (13) in his studies at Phipps Institute demonstrated, by special staining preparations, an increase in ameboid glia cells in two cases of "central neuritis." He describes *nucleoproteid-like granules in the protoplasm of these ameboid glia cells as well as in the larger bodied glia cells, which have a very close chemical resemblance to Nissl bodies*. In 70 other cases of morbid conditions of the nervous system he found in thionin preparations these nucleoproteid granules in 45 cases, none in 25 cases. Generally speaking, the granule was demonstrated in typical ameboid glia cells, or in glia cells in the cortex as well as the central portions of the brain. The cells of the blood vessels around these lesions show very distinct progressive manifestations. *The observer noted a new production of cells of the blood vessels which show a tendency to form new mesodermal granule cells and also to form new capillaries. These cells all carry in their protoplasm the same nucleoproteid-like granules*. Marui came to the conclusion that neuroglia tissue has a double function of scavenger as well as constructor in pathologic and nutritional disturbances of nerve cells.

Netter (14) describes the lesions in encephalitis and calls particular attention to the fact that the pathologic processes occur as perivascular infiltrations with collection of glia cells containing fuchsinophile granules surrounding degenerating nerve cells and fibers.

Globus (15) describes a case of porencephalus distinctly of inflammatory origin in which the photomicrographs show clearly individual glia cells migrating into the pia arachnoid, their processes extending over the subarachnoid space while their cell bodies were still in the peripheral zone of the cortex. Also, larger groups of glial cells were noted streaming into the pia arachnoid membrane alongside a partially obliterated blood vessel. This author notes that glia cells proliferate whenever blood vessels are occluded and migrate along closed vessels toward the seat of the inflammatory process.

Saxer (16) in studying syringomyelia also demonstrates glial infiltration of the pia and describes the transformation of glial cells on reaching the pia arachnoid into macrophages and other phagocytic cells.

Bassoe and Hassin (17) show an excellent microphotograph of the gray substance of the corpus striatum in which a branched blood vessel is shown surrounded by a dense wall of glial nuclei. The sub-

stance shows an abundance of ganglion cells surrounded and invaded by glia cells. It is in such cases that neuroglia proliferative cells act as macrophages.

In all the cases of inflammatory lesions of the central nervous system I have examined in the literature, every one, without exception, show, on microscopical findings, that blood vessel changes are accompanied by neuroglial proliferation particularly localized to areas where the blood vessels were involved.

Hassin (18) presents some excellent microphotographs of a case of lead encephalitis in which a section of the temporal lobe is shown wherein the blood vessel, ganglion cells and many glia cells contain a deposit of fat globules. Another section depicts a newly formed capillary vessel beside which are seen enlarged protoplasmic glia cells packed with chromatin.

Brain abscesses are circumscribed by a pinkish zone of enlarged blood vessels and inflammatory products of repair, prominent in which are an increased number of neuroglia cells.

Hartman (19) demonstrated in acute myelitis that glia cells at first become swollen and slightly increased in number, later on in the process they proliferate rapidly.

In a joint paper, Capoblanco and Fragnito call attention to the mesoblastic elements of the nervous system. These authors noted the manner of their ingrowth, migration and distribution among the ectodermal elements. Later Capoblanco attributed to these mesodermal elements the capability of taking part in the development of neuroglia. In addition, Hatai (20) observes in white rats dividing cells of the endothelium of capillary walls and states that some of the cells resulting from this division migrate into the surrounding tissues. He thinks further that these migrating endothelial cells become neuroglia cells. Hardesty (21) remarks that neuroglia are only so termed after the intermixing of material from the ectodermal and mesodermal germ layers.

Alzheimer demonstrated by his staining methods products of metabolism within the protoplasmic portion of neuroglial cells and he pointed out clearly the scavenger function of this element which he calls amœboide Gliazelle. Merzbacher in his study of the biology and morphology of the granule cell expressed the idea that neuroglia cells may have a reparative or reconstructive and nutritive, as well as a scavenger function.

Uyematsu (22) states in summary of a complete study of the literature and of four cases of glioma of the brain in which he used

all the important staining methods for neuroglia and nerve tissue, that neuroglia is more than a mere connective tissue of the central nervous system, and that it has a reconstructive and nutritive as well as scavenger function; he found in every one of his four cases, in addition to the glioma, generally increased neuroglia tissue in the brain so that a clear line of demarcation of tumor and general gliomatosis was not found. This reactive gliosis appears to be compensatory in character indicating the function of these cells.

Eisath working in the pathological laboratory at Claybury, England, describes that of the changes in the neuroglia in sleeping sickness, glial overgrowth is especially observable around the larger vessels, that it exists not only around those vessels which show infiltration, but also around capillaries where infiltration with round cells has not occurred.

Jackson (23) states that gliosis of the cortical cells can occur as little as 12 hours following cerebral injuries.

In chronic disease processes, in addition to hyperplasia of the neuroglia and substitution of this tissue for the atrophied neuron elements, there occurs spontaneous proliferation of neuroglia in situations in which this tissue is normally most abundant, viz. subjacent to the pia mater, in the tangential layers of the cerebral cortex, around the vessels and in the ependyma. In the last named situation very densely crowded little swellings may be formed constituting the condition known as granular ependymitis. This is probably due to a diffuse nutritive compensation.

In general paresis, the pia arachnoid is very often adherent to the cortex, the ependyma is greatly thickened and microscopically great proliferation of neuroglia and new formation of glia cells occur in regions where this tissue is anatomically more abundant. The newly formed glia cells prior to the elaboration of fibers have migratory and phagocytic powers.

In chronic epilepsy, gliosis can be demonstrated by Weigert's selective stain where there is an increase in fibrils and monsterzellen (Giant Glia Cells) *especially dense around the blood vessels*. These cells show a large cell body with branched processes, a very large rounded nucleus and definite nucleolus. Normal glia cells are similar but smaller in size. Bleuler, who examined twenty-six epileptic brains, found a definite widespread hypertrophy of neuroglia bundles lying between the pia and the outermost layers of the cortex.

Church-Peterson (24) states that "In severe cases of leptomenigitis the cortex is edematous and adherent to the pia mater which

cannot be separated from it without stripping off the gyral substance. In the cord, the *posterior horn and roots* are especially vulnerable. The exudate is usually thicker on the posterior surface of the cord." (Probably due to greater prevalence of neuroglial tissue in that region.) "The histological changes consist of capillary and vascular dilatation in the pia and an active diapedesis into the perivascular sheaths; these are dilated and crowded with leucocytes and purulent elements. The neuroglia cells and network of the cortex show some proliferation."

In the morbid anatomy of syringomyelia, the central cavity of the spinal cord is enlarged and contains cerebrospinal fluid which is sometimes bloody or gelatinous; its walls are made up of a new formation of gliomatous tissue (neuroglia) *rich in blood vessels*, especially the external periphery. The predominance of various elements gives rise to varieties such as pure glioma, neuroglioma and vascular glioma, all of which may be present in the same cord.

In combined sclerosis of the spinal cord the sclerotic plaques present hypertrophied axis cylinders, *many spider cells and notable changes in the blood vessels*. The alterations in the neuronie tissue are proportionate to the vascular lesions and most intense in their neighborhood. Of the combined cord lesions due to anemias and cachexias, Nonne was the first to demonstrate degenerative changes of the spinal cord in ten out of seventeen cases of pernicious anemia. The changes are principally located in the white matter of the spinal cord and show a decided tendency to mainly affect the posterior half, where neuroglia tissue predominates. By experimentally inducing anemia, Massaro, Sciciliano and Soukhanoff have demonstrated neuroglia changes in the spinal cords of animals; others have confirmed Nonne's findings but broadened the general field of degenerative conditions in the spinal cord due to depraved physical states.

Multiple cerebrospinal sclerosis is a disease secondary usually to some intoxication or infection often of a mixed sort; it is marked by numerous islets or plaques of sclerosis irregularly distributed in the brain, cord and cranial nerves. *These are related to the blood supply of the part and are probably primarily vascular*. Microscopically, in the sclerotic plaque there is considerable proliferation of neuroglia with diminution in size of the nerve cells which are atrophic and often pigmented. *The vessels in the plaques show decided changes; the coats are thickened, especially the external tunic, and the perivascular sheaths are often dilated and at times obliterated. One vessel particularly altered is usually found near the center of each small*

sclerotic patch and the sclerosis is most intense at this point. The appearance indicates that an early embolism or thrombosis sets up vascular lesions extending to the perivascular spaces, and entails first compensatory, then irritative sclerosis of the adjacent neuroglia.

In the paralysis agitans, Redlich found in severe cases small patches of sclerosis mainly in the posterior columns *which originated from the vessels and showed atrophy of nerve fibers and an increase in neuroglia tissue.* The process was an endo- or peri-arteritis with extension to the surrounding parts. Gordinier has collected twenty-four cases of paralysis agitans examined by recent methods. In all there was decided uniformity of anatomical findings involving *the blood vessels, neuroglia and nerve cells.* There was proliferation of nuclei and thickening of vascular walls, *increase of neuroglia about the blood vessels, and patches of perivascular sclerosis* with pigmentation, degeneration and atrophy of nerve cells and nerve fibers.

Spielmeyer (25) observes that the foci in the brain in typhus fever were composed principally of proliferation of neuroglia and in most instances exclusively of this substance. There were further diffuse changes in the nervous system in the form of plasma cell infiltration of vessels of the central tissue, deposits of cells in the pia mater and signs of decay in the nervous parenchyma.

Von Podmaniczky (26) states that bursting of a vessel with bleeding in the brain tissue leads to *locally circumscribed degeneration of the nerve tissue together with degeneration of the glia*, but obstruction of circulation as the result of gradual changes in the walls of the blood vessels leads to widespread degeneration of the nerve tissue, but the glia remain intact and there is a lively proliferation. Glia always responds to every sort of stimulation with exactly the same form of proliferation. This phenomena is therefore not conditioned by the form of the disease but by qualities inherent in the nature of this tissue.

Schrottenbach (27) remarks that in his case of idiopathic internal hydrocephalus, the accumulation of young cells around the astrocytes suggest the probability that these spider cells form the nutritional center for the younger cells.

Bramwell and Miller (28) carefully note that in encephalitis lethargica the pigment, instead of being confined to the nerve cells themselves, was scattered in rounded masses in the surrounding tissue, both free and inside phagocytic cells. There was at the same time a proliferation of neuroglia cells in their neighborhood, *the pigment*

being largely contained in the proliferated neuroglia cells, not infrequently these cells (as Marinesco points out), contain several nuclei.

We find that glioma is peculiar to nervous structures; it always arises from neuroglia and finds its most usual seat in the brain, though it may occur in the spinal cord or retina; it presents a reddish vascular color and soft consistency quite like that of brain substance. The center of the tumor is frequently filled with softened products, which may become fluid and thereby cystic (degenerative products of neuroglial plasma).

Many alleged local brain hypertrophies have been gliomatous infiltrations in fact and the microscopic examination of cyst walls has alone discovered the true nature of the lesion in other instances.

In consistency gliomas are soft, *often highly vascular, and may in some cases be easily mistaken for angiomata. Hemorrhages not infrequently occur in them.* In other cases a great amount of interstitial fluid gives them a myxoid character. Gliomatous tissue often appears to take on vicariously the function of blood vessels themselves. Councilman gives the following peculiarities of glioma:

(a) The manner of growth is by infiltration, not expansion.

(b) Glioma replaces tissue and the form of the tissue replaced may be perfectly preserved.

(c) Cyst formation in glioma is due not to degeneration, but to fluid absorption of the tissue and represents an accentuation of a condition common to the entire tumor.

(d) Gliomatous growth is always limited to the neuroglia tissue in which it originates and never infiltrates the membranes.

(e) Glioma *never* gives rise to metastases.

(f) Gliomatous and sarcomatous tissue may grow side by side in the same tumor, but even this condition was seen only once in twenty-five cases studied. Councilman also calls attention to an increase in general distribution of neuroglia in the brain outside the margin of infiltration in cases of gliomata.

Spiller and recently Clark have attributed an actual increase in the size of the brain tumors to general hyperplasia of the neuroglia. It may be moderate in large tumors and so marked in small tumors as to cause much enlargement in the hemisphere in which it is located. This hyperplasia of the neuroglia may occur in any kind of brain tumor. It is especially concentrated on the exposed surface and in those places where the brain substance is invaginated by nutrient vessels. Every vessel is thus surrounded by a network of fibers; sometimes there are even projecting brush-like masses on the outer

surface which aid in causing adhesion to the meninges. The superficial layer, normally rather indistinct, here becomes a dense felt work of neuroglia fibers extending a little way into the cortex and devoid of nerve cells. In the spinal cord, tract degenerations are found especially in the posterior columns.

Gliomas have special characteristics which remind one very readily of angiomas, lymphogenous tumors or both combined by reason of the following facts:

1. They are benign growths per se, never give rise to metastases, and are soft in consistency.
2. Special tendency to sudden extravasations of blood into its substance.
3. Their preference to situations immediately around blood vessels.
4. Tendency to degenerate into cystic cavities with transparent plasmatic fluid.

Saxer described tumors in which the ependymal elements occupy the predominant place and grow up into papillary masses resembling those seen in the mucous surfaces. These cells are, however, of the same origin as the neuroglia elements in general.

From the foregoing pathological reviews, we can readily see that the constant response to inflammatory reaction in central nervous system lesions is always accompanied by marginal hypertrophy and proliferation of neuroglia in an effort at repair. These neuroglia cells bring to the part affected a wealth of biochemical constituents which, although often failing to regenerate the destroyed cells, tend to prevent autolysis and extensive liquefaction of the surrounding tissue. In this manner they are the advance guard to the formation of new blood vessels and, by reason of their great adaptability to emergencies, frequently succeed in circumscribing disease of moderate virulence. The positive chemotactic power of neuroglia for inflammatory sites is another reason for considering it of special significance in the relation of a highly differentiated cell resembling at one time a phagocytic, and at another, a nutritive type of cell. This idea of its nature seems to become more fixed as the study progresses.

In the morbid anatomy of inflammation of the cerebrospinal system, we must consider four important factors—

1. Changes in the blood vessels.
2. Changes in the blood vessel contents.
3. Changes in the perivascular tissues.
4. Termination of the process.

At the beginning of an inflammatory reaction, the blood vessels contract and marked acceleration of the blood current takes place; this is of brief duration and followed by vasodilation with an excess of blood movement, diapedesis of plasma and amoeboid leucocyte invasion into the perivascular spaces (the type of leucocytes depending upon the nature of virulence); here the neuroglia become swollen with excess plasma and reinforced by leucocytes tend to overcome the irritant factor, in which case success is attended by the removal or neutralization of the products of inflammation with a recession in the size of the glia cells and disappearance of leucocytes; or, if the process is too virulent and there is failure at repair, necrobiasis takes place accompanied by proliferation of neuroglia in a still further attempt to localize and check the autolytic process; where the exciting factor is of feeble virulence and predominates for a longer period, a productive inflammation occurs with gradual obliteration of the larger blood vessels, a new formation of capillaries and neuroglia, together with an increase in the connective tissue of the pia dipping down between the sulci, resulting finally in pressure atrophy of the neuronal elements. This picture is evident in cases of senile dementia, cerebrospinal syphilis, paresis, tabes, chronic toxic and other encephalopathies.

During the secondary degeneration of the white fibers within the central nervous system there is a proliferation of the neuroglia. The multiplication of neuroglial cells begins in the white matter, according to Ceni, some forty-five or fifty days after the lesion. These neuroglia cells cease to multiply at about the hundredth day, after which there is a gradual disappearance of their nuclei and simultaneous progressive sclerotic change. In this instance the neuroglial tissue is compensatory and after a certain period of time (about fifty-five days) it ceases to be of functional value and loses its identity by metaplasia, *i.e.*, degenerating into simple fibrous tissue. This identical process occurs in all chronic inflammation of the central nervous system.

We have seen that neuroglial proliferation attends inflammatory processes. The question now arises, does a sudden deficiency in blood supply due to ruptured blood vessels, emboli, infarct, etc., show a decrease in number of these neuroglial elements?

Siegmund (29) recently describes a fatty degenerative process of neuroglia, termed encephalodystrophy, which occurs in the newborn as result of hemorrhagic brain trauma; also, that mechanical injuries to the small vessels cause disturbance in the circulation result-

ing in impaired nourishment and fatty degeneration of neuroglia and neurons, frequently terminating in softening processes which are in close relation with development of cysts, porencephaly, microgyria, etc.

Church and Peterson in describing the pathological anatomy of cerebral softening say, "In a very few days after arterial obstruction has occurred the corresponding cerebral tissue presents a marked appearance of degeneration. It is a fact of practical bearing that nerve cells deprived of their nutritive supply for about forty-eight hours are permanently ruined. *The softening focus is infiltrated with serosity and the cellular and neuroglial elements are already breaking up.* The myelin separates into droplets and is rapidly taken up by migratory leucocytes. The degenerating focus shrinks and softens. If situated beneath the pia, the resulting depression is filled with turbid milky fluid."

In old foci of softening *the surrounding tissue is thickened, especially in its neurological makeup, and presents an indurated wall within which is a yellowish fluid substance containing fat crystals and amorphous matter* (probably representing degenerated neuroglia and nerve tissue).

In a case of microgyria, described by W. Page May, (30) the atrophied cerebellum showed distinct deficiency in the number of so-called cells of Golgi (neuroglia).

Having considered some aspects of pathology with its relation to neuroglia, it would be well to formulate some conception of the rôle played by neuroglial tissue physiologically.

Like all other cells in the body, the neuron receives its nourishment directly or indirectly from the blood or lymph stream. If the normal neuron received its nutriment directly from the blood stream naturally its activity would be either quickly enhanced or diminished according to the changes in the quality of the blood received, the changes in pressure and amount of blood movement at a given time. The physiological qualitative and quantitative circulatory changes at times are so sudden that it seems logical to assume that if the neuron did receive its blood supply directly, it would be in a constant state of unrest, at one time overnourished and at another undernourished; whereas, on the other hand, if the neuron received its nutriment indirectly from a storehouse of wealth of biochemical products ever present in the surrounding neuroglial tissue which could be called forth from its branching fibers either by osmosis, electrion force or

ultra filtration, the necessary ingredients would be readily at hand to supply the neuron with dynamic energy *as it is required*.

When there is a deficiency in the body of certain necessary biochemical ingredients such as thyroxin in myxedema, the vitamins in deficiency disease, and where toxins are present in the circulating media, etc., these neurons are inadequately nourished, hence the glia cells have not the elements necessary for elaboration of proper nutriment, giving rise to the well known symptoms of disease which histopathologically present numerous instances of hypertrophy and hyperplasia of the neuroglial tissue, nature's effort to compensate vicariously for inefficiency to carry on proper function.

Barker states, "It seems probable that various typed neurons select various nutriments and complex chemicals suited to their specific needs, and one prominent feature is particularly evident, that with chemical processes ever in progress, with synthesis and decomposition reactions going on all the time, the one set of reactions predominating at one moment, the second at another, both classes of changes occurring with great rapidity and again with comparative slowness, but in any case always continuously, a certain constancy of structure and function is maintained as illustrated by the faculty of memory."

Where excessive function of the neuroglia is induced by systemic disturbances, the metabolized products formed are greatly in excess of neuron requirements, hence the unused products pass out quickly through the veins while some filters through into the interstices of tissue, causing edema.

In acute cerebrospinal hyperemia, neuroglial cells are overtaxed by an excess of enriched plasma absorbed from the congested blood vessels and upon being transmitted to the nerve elements create irritation with resulting hyperactivity. In such cases the increased nerve metabolic products can be demonstrated in the cerebrospinal fluid which is in small part made up of neuroglial plasma and shows approximately dilute blood plasma composition. Where pial congestion becomes more pronounced and lasts for a longer period, a defensive process results in the formation of embryonic neuroglia cells in an attempt to distribute increased plasmatic fluid, and as the process continues, these newly formed glia cells become larger, branched processes appear taking up considerable space occupied by the nervous elements and finally metaplasia or fibrous changes occur resulting in degeneration of neurons by pressure atrophy. This process of overgrowth of neuroglial cells is similar to pathologic

changes that take place in other organs where hyperemia results in chronic inflammation and is accompanied by numerical increase in blood vessels interfering with the special function of the organ affected.

Analyzing the causative factors of convulsive states and epilepsy, one can almost always trace them to some disturbance in the nutrition of the nervous elements, whether it be due mechanically to physical interference with the blood lymph supply, or whether the blood itself is pathologic owing to metabolic, toxemic, infective, parasitic, auto-toxic, endocrinic, blood dyscrastic or other factors which seriously deprive the neuron of its proper nourishment. A disordered relationship between the normal nutritional elements of the blood system and its proper utilization by the neurons themselves gives rise to dysfunction on the part of these elements, and in some instances when the defensive mechanism is impaired, cause concentrated, irritative responses and outbursts culminating in attacks of delirium convulsions, unconscious states and a great variety of symptoms attributable to the central nervous system. Should the causative factor be entirely eliminated before secondary hyperplastic neuroglia changes occur, these symptoms cease, but if they persist, as is often the case, increased vascularization accompanied by proliferation of neuroglia takes place, secondarily crowding the already overburdened nerve cells, resulting in pressure atrophy which finally terminates in cessation of neuron function.

SUMMARY

Grouped summary and reasons for considering neuroglial tissue as direct nutritional element and elaborator of highly specific plasma intermediate between blood-lymph supply and nerve cells, as differing from the orthodox theory that it solely functions as connective tissue of the nervous system.

Embryology

1. Ectodermic origin as differing from all other connective tissues, with exception of certain organs of special sense.

2. Difference in chemical properties between developing neuroglial cell and fiber in the embryo as differentiated from similar chemical properties of other connective tissue cells and fibers elsewhere.

Anatomy and Histology

3. Insufficient collateral circulation of cortex and terminal circulation within basal ganglia.

4. Close proximity of glia cells to blood-lymph vessels.
5. Presence of sucker disc-like expansions of neuroglial fibers of both gray and white matter attached intimately to walls of blood vessels.
6. Presence of a system of canaliculi and lymph spaces surrounding the body and processes of protoplasmic glia-cells directly continuous with perivascular lymph spaces.
7. Tuke's diagram showing perivascular lymph spaces intimately surrounded by neuroglia.
8. Presence of glia capsule surrounding intimately nerve cell bodies and their processes.
9. Replacement of neuroglial sheaths for neurilemma within the brain and spinal cord in medullated nerve fibers where the neurilemma is absent.
10. Neuroglial investment of optic and olfactory nerves throughout their course, while other cranial nerves lose this sheath shortly after leaving the brain.
11. Lack of uniformity of distribution and condensation of neuroglial tissue in various parts of the gray matter, as in the formatio reticularis, inferior olive, projecting lateral horns and where nerve cells are grouped into nuclei.
12. Variation in distribution in the posterior horn, the apex consisting almost exclusively of glia tissue while the remainder is relatively free from this tissue.
13. Relative scarcity of glia in the white matter.
14. Posterior pituitary body composed entirely of highly differentiated neuroglial tissue.
15. Presence in pineal body of a dense network of neuroglial fibers.

Comparative Anatomy

16. The human cortex is relatively much more richly endowed with small type glia cells and plexuses of glia fibers than animals.
17. In birds, the relationship of glia and vessels is very close, and the glia is autonomous. The glial feet are attached to a large part of the vascular surface and form a complete sheath about the vessels. These feet and sheaths present a finely reticulated and vacuolated structure showing that they are not merely for support, but of functional character.

Physiology and Biology

18. Gliosomes within the spongiosplasm of glia cells vary in number, size and staining reactions according to functional states.

19. All glia cells possess a centrosome, showing reproductive powers.

20. During evolution glia is capable of phenomena of migration and expansional transformation.

Pathology and Pathological Physiology

21. Presence within glia cells pathologically of nucleo-proteid granules, which have a close chemical resemblance to Nissl bodies.

22. Tendency of glia to form new capillaries, the cells of which carry in their protoplasm the same nucleo-proteid-like granules.

23. Migration of glia fibers pathologically into the arachnoid, the cell bodies remaining in the cortex.

24. Transformation of glia cells into macrophages and other phagocytic cells with migratory powers.

25. Proliferation of glia pathologically, particularly marked around the blood vessels.

26. Deposits within glia in certain diseases of fat globules and chromatin.

27. Tendency to rapid swelling of glia cells in acute inflammations.

28. Presence of great increase of glia cells in reparative wall of brain abscesses.

29. Demonstration of products of metabolism within the protoplasm of glia cells by Alzheimer.

30. Rapidity of gliosis in cerebral injuries, even within twelve hours.

31. Frequent evidence of nutritive compensation in disease.

32. Special vulnerability to localization in leptomeningitis to pia. cortex and posterior horns and roots, where glia tissue is normally more abundant.

33. Presence in central canal in syringomyelia of gelatinous or even bloody fluid and richness of blood vessels in the gliomatous tissue.

34. Tendency in anemias and cachexias to affect mainly the posterior half of the spinal cord where neuroglia is normally more prevalent.

35. Multiple sclerosis is considered by many as primarily vascular in origin.

36. Sclerosis is particularly evident around perivascular spaces in chronic diseases.

37. Rupture of blood vessels causing degeneration of nerve cells is accompanied by degeneration of glia cells, but obstruction of circu-

lation as the result of gradual changes in the walls of blood vessels leads to lively proliferation of glia.

38. Pigment of same chemical characteristics are present in both nerve cells and adjacent neuroglia in encephalitis lethargica.

39. Characteristics of glioma indicate its close inter-relationship with blood-lymph tissue, viz: its preference to regions around blood vessels, its reddish vascular color, soft consistency, hemorrhagic tendencies, benign nature, the great amount of interstitial fluid it contains which often becomes cystic, and the general increase numerically of glia cells in parts distant from the mass.

40. Generalized hyperplasia of neuroglia in all kinds of brain tumor (it is this which causes more intracranial tension than original tumor mass itself).

41. Constant response of hypertrophy and proliferation of glia to inflammations as reparative effort.

42. Hemorrhagic softening of brain attended early by autolysis of both neuron and neuroglial tissue and frequent replacement by free plasmatic fluid.

43. Fatty degeneration of neuroglia termed encephalodystrophy due to sudden deprivation of normal blood supply in hemorrhagic trauma of new-born.

44. Definite deficiency of glia tissue in cases of microgyria.

CONCLUSION: THEORY

For the reasons above enumerated and in the text, it seems reasonable to conclude that normally neuroglia cells functionate as nutritive reservoirs and elaborators of highly specialized secretion of plasmatic fluid necessary to neuron tissue. They are intermediate between the blood-lymph supply on the one hand and nerve cells on the other. Protoplasmic neuroglia cells are glandular in nature and produce a true internal secretion, receiving arterial blood plasma under positive pressure by means of suction feet which transmit raw material to its protoplasm, where a complex specific neuron plasma is elaborated and imparted through its numerous branching fibers to nerve cells as required. The neuron metabolic products are removed via a system of fine lymph canaliculi surrounding these glia fibers and returned under negative pressure to the perivascular lymph spaces and veins back into the circulation. Thus neuroglial tissues are the direct nutritive elements of the central nervous system.

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PARANOID PSYCHOSIS WITH UREMIA

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Paranoid delusions and paranoid psychoses have stimulated many theories but no wholly acceptable explanation. In spite of efforts as widely divergent in nature as the work of Southard (1) and the work of Freud,(2) the paranoid trend remains one of the mysteries of psychiatry.

Nothing bears this out better than the great confusion of nomenclature and terminology as applied to various syndromes characterized by paranoid delusions and hallucinations. In a rather hasty survey (3) of the field some years ago I found something over sixteen syndromes claiming autonomy but overlapping in many particulars, all of which I thought might very pragmatically be grouped in one family as simply unexplained "Paranoid Psychoses." Anyone familiar with the pointless discussions common in psychiatric clinics with hair-splitting distinctions between paranoia, paraphrenia, paranoid schizophrenia and "other paranoid conditions" will agree that generalizations either along the Freudian or the Southardian lines would be more likely to contribute to an ultimate understanding of the syndrome than this fruitless Kraepelinian dialectic.

Were Kraepelin's method truly followed and individual cases collected in large number in minute detail, further contribution might be made in still another direction. Psychiatry lends itself to progress by inductive reasoning, but that is no reason, of course, for the neglect of deductive logic. It is rather remarkable, for concrete example, how little study has been made of paranoid delusions in the course of organic brain disease. No better single example could be cited than that of paranoid delusions in the course of uremic delirium (to be illustrated in this paper).

"The affect," says Bonhoeffer,(4) in regard to uremic delirium, "may be that of anxious excitement and ideas of poisoning and of external influence entertained for a long time with a tendency toward systematization." This author then cites a case (it is one of the few in the literature) which is that of a fifty-four-year-old man who thought he was being poisoned, starved to death, etc. Bonhoeffer also describes another case in which a patient had delusions of poisoning without loss of orientation. He mentions still a third case with

peculiar fixed delusions present in a patient who five years after a nephrectomy developed a pyelitis in the other kidney and subsequently a delirium.

Bluemel (5) describes a woman of fifty-seven who demanded admission to the city jail and was eventually committed as insane. The diagnosis of uremia was clear. The symptom to which I desire to call attention is that "with increasing disturbance the patient became more definitely delusional and would often speak of being persecuted by the Masons and the A.P.A. She said that old Dr. M. had killed her sister and all the children got sick and she frequently refused to eat and in every respect she was most difficult to manage."

Kraepelin (6) has very little to say about uremic delirium and in only one line mentions paranoid tendencies: "They see dogs, want to fish in the bath, they think they are at a wedding, have ideas of poisoning and thoughts of death and fear they will be hung or castrated."

CASE REPORT

The following case is reported to illustrate paranoid delusions with persecutory hallucinations in a uremic patient who subsequently recovered mentally with complete insight, a circumstance which made it possible to investigate more thoroughly the nature of the delusions which she suppressed. Not the least remarkable thing is the fact that she declared afterwards that her psychosis had long antedated anyone's suspicion of its existence.

The patient was a woman of forty-six whose parents were both living in their late seventies. She had been married for twenty-five years and had had four pregnancies, all of which resulted in living children who were healthy at the time of this illness.

Her past history had been essentially negative. She had never had a known attack of uremia before but had been getting stouter for some years.

Present Illness: About January 1, 1921, she began to worry much over her daughter's pregnancy. For possibly as long as fifteen months she had been complaining of severe headaches, occasional backaches, fatigue, feet and ankle pains. She was never bed-ridden with these afflictions.

The first mental symptoms were *observed* about nine months (or less) prior to my first contact with her. Her daughter became pregnant, over which she concerned herself unduly, and in connection therewith began to feel that her son-in-law was stepping in between her husband and herself. She thought he was prejudicing her husband against her, that her husband preferred his opinion to hers, and didn't want him about during the birth of the grandchild. She told her husband, "I hate him, hate him, I hate the ground he walks on. If I live through this, it'll be a wonder to me."

These physical and these mental symptoms both increased slowly,

coming to a climax on May 22, 1921. On this date her daughter's baby was born. In the evening she was helping her husband prepare a bed and suddenly fell to her knees, head and hands on bed, then sank to the floor and rolled over. (Of this she afterwards stoutly maintained that she had been suddenly struck a heavy blow on the back of the head.)

They lifted her to the bed, where she didn't recognize them, but thought they were persons wishing to harm her. "No, you ain't them, you ain't my folks," etc. Suddenly she became quiet and then burst into tearful smiles, saying, "Oh, I'm so glad you came back; I'm so happy, I'm so happy." She then asked where she was and what had happened. The rest of the night, however, she was restless, mildly delirious, told her doctor he was deceiving her, that he was in a plot with her husband against her, that they were taking the baby away, that they were taking her things out of the house, etc. This represents the state of affairs for the next five days.

She was taken to the country home of her father, and improved very markedly. She was up and about the house. She still had the delusions of persecution, however, especially in regard to her son-in-law, but they didn't question her about them nor did she bring the matter up and hence all thought she was much better.

After nearly a week she was brought home, stayed a week, seemed to lose ground, rambling in her talk and ideas in an erratic and disconnected manner: "I know what I want to say, but I just can't say it." Returned to the country, she improved again, helping with the work to a slight degree. After a week she came home for a week and again got worse. Dr. Schwartz asked me to call on June 10, 1921.

She was then in the state in which she had been for a week, namely: toppled over when attempting to walk, prostrated in bed, urinating very little, very constipated, rambling in delirium, hallucinated as to voices of quarreling men outside, etc., and only occasionally at all lucid. She told her relatives she was going to die, bid them goodby, etc. She complained of severe headache and of pain in the abdomen and rectum.

Examination on July 10 was negative except for the following points:

Physically, marked obesity (five feet three inches in height, one hundred sixty pounds in weight), acetone breath, puffy face with dilated capillaries, no edema of extremities, small hard pulse, blood pressure 115/75, dry skin, anuria!

Neurological Examination: Right pupil greater than left, reaction slow, and incomplete left Babinski, reflexes all very sluggish, and frequently not elicited. Sensation tests poorly replied to, because of stupor.

Mental Examination: Typical delirium; muttering, thickened speech, expressing fleeting delusions and hallucinations with considerable emotional reaction, chiefly sorrow and resentment. She was drowsy and troubled by turns.

LABORATORY FINDINGS, JULY 13, 1921

Blood:

Urea	45.75 mgm.
Sugar	0.11%
Creatinin	1.75 mgm.
Hemoglobin	86%
Erythrocytes	5,024,000
Leucocytes	10,250
Differential:	
Neutrophiles	47%
Lymphocytes	44%
Eosinophiles	9%
(Later only 3%)	

Urine (many examinations):

Acid reaction.

1.035 specific gravity.

Trace of albumin.

Trace of sugar.

Much pus.

Few hyalin and granular casts.

24-hour urine urea output, 5.22 grams.

The output of urine was 200 c.c. or less for nearly three weeks (19 days), after which it rapidly increased up to normal.

She was taken to the hospital at once. Temperature ranged around 100 rectal, pulse 100, respirations 28 per minute. In general these figures remained the same for the first week, after which the temperature was in the neighborhood of 101.5, the pulse as high as 120, and respirations 30 per minute. They then gradually fell during the second and third weeks so that on and after the seventeenth day they were normal.

In the meantime the woman had become typically *comatose*. She was given caffein, sodium benzoate (grain $\frac{1}{2}$ every 2 hours), salt solution by rectum and steam baths twice a day, with vigorous catharsis.

Course of Mental Symptoms: A lumbar puncture was done on the first day. This seemed to relieve her coma but she was markedly delirious for the next two weeks. She slept a great deal but when awake and particularly when the nurse or visitors were in the room she cried and talked in a mumbling fashion about people being killed and of going to church and of going home. She would call for people at times and when an attempt would be made to quiet her she would burst into tears. At times she seemed to be talking quite sensibly but one would no sooner begin to follow her ideas than she would be off on a totally unintelligible stream. Very frequently it seemed as if she were about to say something and she could be easily understood but she would get hung up on a word and would be

unable to go any further. Often she would use obviously the wrong word and this would distress her even more than the listeners. She became more and more quiet and reasonable during the last few days and owing to the burden of hospital expense and her apparently great desire to go home, her relatives prevailed upon us to allow her to be taken to her home. Here she seemed to improve very rapidly and in fact from the evening of that day on seemed to clear up completely mentally.

PATIENT'S ACCOUNT

Her description of her own mental illness was secured while she was still in bed. This follows:

"I knew it for seven or eight months before it came. I felt this thing coming on. The first thing I noticed was when I was shopping I had a feeling as if everything was leaving me including my mind. *I began to think that the world was against me and I was losing out everywhere.* I began to think my husband was unfaithful, that he was being taken away or that he was going to leave me, that he was lying to me and that they were all in a gigantic plot against me.

"All the time I was scared to death they would find out. I would be deluded like that for a time and then at another time I would be aware of the fact that it was false but then I was so terrified with the thought of losing my mind that I could think of nothing else. Why, I cried in my terror and anxiety—I cried all the time when they didn't know it.

"People noticed that I didn't talk plain. They frequently spoke of it, but I tried to hide it and tell them that they were mistaken. I really noticed it myself, however, and that it was another sign that my mind was going. Throughout these six or eight months things grew more and more muddled, but every day I had the terrible fear which I supposed was the realization that I was losing my mind and that sooner or later it would be found it. Why, one day when I got mixed in trying to say something my daughter said in a joking way, 'Mother is getting nutty, isn't she?' This almost broke my heart, and I was so disturbed and terrified that I left the table and went to my room.

"And then I was really changing so in disposition. I was unkind to everyone, irritable, disagreeable, no love in my heart—why, I wasn't even civil. The last night, I remember, before everything went black, during the episode when I thought I had been struck on the head—it was as if someone had given me a blow with a club in the back of my head and after that I can remember nothing definitely until everything suddenly got clear on the day I came home from the hospital.

"I did not remember all these things that they told me about—of your coming, of my relatives coming, or my wild talk, or my fear of dying, of my very serious condition, the ambulance, the hospital, etc. I do have a vague memory of being at the hospital and a vague memory of many things that happened, but they are all lost in the

tremendously vivid memories I have of what I thought was happening and of what I now know to have been imagination.

"The chief thing was that I was so afraid. I feared everything—why, I loved that nurse so much and I feared even her. I was afraid she was going to boil me (in the prolonged bath), to tie me down, to cut me up, and in fact I usually did feel as if I were tied down between some people. One particularly terrible night, I thought all night that beside me my father was tied down and a hog was eating his arm! I thought my father was being killed, that their personalities were being destroyed, that my husband was being murdered by being pressed in mechanisms of torture which I manufactured out of the clothes press, that he was being put in stocks and his legs were chopped off and all such terrible things as that.

"My little granddaughter seemed to be a very important feature. I thought her hands had dropped off or been chopped off and that after this happened the little child exploded in the air and then you would not let me bury her corpse so I hid it in my bosom and I kept it there for days and days.

"I thought you were burning my children, especially their feet, and I remember I screamed and wanted to escape and save them.

"I was very much afraid of you, Doctor, in fact, I was afraid of everyone and all the nurses whom I thought were helping with the tortures and everyone who came to see me. There was only one of whom I was not afraid and that was your father, Dr. C. F. Menninger. I thought he was the kindest man I ever saw in my life. Why, even his voice sounded kind and as if he cared that I was living and would help me. And his voice stayed with me. I don't know that I would know him at all now.

"I tell you, Doctor, the whole hospital experience seems in my mind like a sort of—what is it you do when you eat and have music and a noisy good time? It's a cabaret, that's it, seems like a cabaret. You thought I was well when I came home, Doctor, but I was not, I was dreadfully homesick but I was not straight on these delusions quite. Some of the time I thought I was, but all the time I couldn't be convinced that my little granddaughter had not been killed. It was the evening that everything became clear to me that I understood the truth."

The patient's account as given above is as nearly as possible given verbatim, although there have been some interpolations and omissions in order to clarify and yet condense the report. The nurse who was in charge of the case day and night says that she frequently cried and declared her loved ones were being killed, but that she never mentioned any of the delusions which seem to have been most prominent such as the amputation of limbs and the explosion of the baby and her great fear of the doctors and nurses.

PSYCHOANALYTIC INTERPRETATION

Unfortunately no psychoanalytic investigation was possible, but some features of the case are particularly suggestive and valuable

from the Freudian point of view and merit at least an inferential consideration.

In the patient's own account, for example, this theme is frequently repeated: "I had the terrible fear that sooner or later it would be found out." Here the "it" means precisely what she said—*i.e.*, that she was losing her mind, which is to say that the repressions of a lifetime were being overthrown, and herein the double significance of "be found out" become clear.

It is striking, indeed, that the mental symptoms appeared first about the time of the patient's daughter's conception, and culminated in a crisis at the time of the child's birth. It is no less significant that prior to the birth of this child the delusions were focused on the son-in-law, and afterwards on the new-born grandchild.

The conventional presumptive interpretation of this alignment of symptoms would be that a latent homosexuality had (by reason of the uremic brain injury?) sprung its moorings, escaping no longer as the sublimated products of repression, but as a frank fixation on the daughter, and consequent jealousy of the daughter's husband (a situation familiar enough apart from delirium in the inverted Oedipus manifestations of a mother jealous of her daughter-in-law). This picture, in short, resembles very closely the ordinary (inverted) Oedipus complex (*i.e.*, mother-son attachment) except that here the homosexual rather than the heterosexual elements dominate.

After her son-in-law she was most hostile toward her husband, *i.e.*, toward another rival for her daughter's love. It is noteworthy that this jealousy came first, just as his rivalry for the daughter's love preceded that of the son-in-law. Finally there came the rivalry of the newcomer into the field, the daughter's child, against whom the bitterest of (unconscious) feeling was represented clearly. Thus in the delusional system of the delirium, the husband (and father) are subjected for the most part to mere castration ("a hog was eating his arm," . . . "his legs were chopped off" . . . "mechanisms of torture"), whereas the new rival was first castrated, then utterly destroyed ("her hands . . . chopped off . . . and she exploded in the air") and even returned to the womb(?) ("I had her in my bosom . . . for days and days.") The last lines of her account are most illuminating. ". . . I couldn't be convinced that my little granddaughter had not been killed." Finally it is interesting to note her total exemption of my (*i.e.*, *her?*) father, who alone represented no rival (infantile) love interest (to her).

The whole episode may be regarded as a collapse in repressions

of homosexual attachment. Freud has said that many of his severe "functional" cases were the children of known syphilitics. We may assume that the psychosexual pathology was made possibly by a defect in some part of the machinery producing "mind," most likely the brain. Here again we have psychic mechanisms apparent, accompanying an undoubted toxic encephalitis* (uremic delirium and coma). The Freudian analysis offered (acknowledged as incomplete) merely contributes to the more accurate understanding of how the brain failure was manifested, much as bradykinetic moving pictures show the component minutiae of movements well known in the ensemble.

SUBSEQUENT HISTORY

The patient was discharged on April 16. Subsequently she was observed carefully in the office and did excellently the rest of that year. She took a trip to Virginia and enjoyed it thoroughly. By way of treatment she had five infected teeth pulled and for a time kept herself on the Carrell diet. She lost a good deal of weight but her blood pressure remained rather high (in the neighborhood of 170 systolic and 100 diastolic).

During March and April of the next year she was in the hospital, chiefly because of the distress caused by a hacking cough and the dyspnea from a typical cardiac asthma. She went home very much better but during the last two weeks of June took suddenly ill again with cardiac asthma and died the last day of June. She had good insight and complete consciousness up to the end. She was quite aware of the trend of her disease during the last few weeks and took the attitude that it would be better to die than to continue so distressing an existence.

It is important from the psychiatric standpoint to emphasize that neither at this time nor any previous time in her history did she show any paranoid trend whatever. She was an exceedingly agreeable patient who was loved by everyone who knew her.

Conclusions

A case of uremic delirium is presented with some citations from the literature relative to the points illustrated in this case, namely, paranoid delusions and hallucinations in the course of the psychosis. The outstanding feature of this case is the fact that the patient recalled her delusions afterwards and related them in

* For a brief discussion of the derivation of psychic symptoms in epidemic encephalitis, see Menninger, Karl A., Postencephalitic manifestations, *J. A. M. A.*, Nov. 10, 1923, Vol. LXXXI, p. 1627.

great detail, revealing the fact that they were not only much more numerous than anyone supposed but that they antedated by many months their verbal expression. The patient showed no paranoid trend before or after this attack nor was she at any other time delirious or psychotic. An inferential psychoanalytic interpretation is suggested.

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A CASE OF OBSESSIONAL NEUROSIS

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Abstract of History. Mr. B., aged forty, was admitted to a private hospital for mental diseases in the fall of 1920. His condition was one of moderate anxious depression, with inability to carry on with his work. He had been a successful civil engineer, was married, and had three children—a boy of eleven, and two girls, seven and nine. The onset of nervous symptoms was insidious, and dated back at least five years. At that time, while holding a congenial business position in the West Indies, he felt languid and “run-down” and talked of a long vacation, which was impractical to take at the time. He gradually lost zest and interest in his work, though continued in the employ of the same company till the day before admission. At the beginning of 1915 he was transferred to the United States, and from then until the Armistice in 1918 he held a responsible position in a plant for the manufacture of munitions, and seemed to feel better under the stimulus of war excitement and the hazards of his work.

Throughout this period, in spite of what was quite an ideal home situation, there developed a gradually increasing underlying feeling of discontent with life. He became retiring and quiet, in marked contrast to his former makeup. For three years he had been tormented by an obsessive suspicion of his wife's unfaithfulness, for which there was not the remotest basis. He never accepted this as absolute fact, and could drive it away by summoning logic and reason to his aid; but the idea lurked always in the shadows of his mind.

In addition to the more recent symptoms, he had throughout his business career shown a tendency to develop minor grievances against his associates, which he would brood over and talk about for months and years. He indulged periodically in alcohol during his college and early business life, but for many years had been wholly temperate. A number of vacations following the war, one of three months' duration, brought only temporary improvement. He entered the hospital voluntarily, seemed relieved to have taken the step, and welcomed the protection and hoped-for aid which it offered.

After two months' residence with intensive analytical study, he

was nearly completely free from symptoms, and with a satisfactory insight into their nature and origin. For the next year he faced greater external difficulties in his life—financial and otherwise—than ever before. In spite of these obstacles, reports after two years showed there had been no return of depression or suspicion; he had avoided grievances against others and felt better and happier than for many years.

History. The history was obtained from the patient himself and from his wife, who was brought up in the same town and had known him all her life. Both were intelligent, coöperative and frank, and able to view facts with unusual freedom from bias. Mr. B. was an only child and lived in the small town of his birth until manhood. His standard of living was on a level with that of his mates. He was always considered to be unusually robust physically. As a child he was left much to himself, both parents being absorbed in the success of a small business, which caused them to spend the whole day away from home. He was never treated harshly, but often felt lonesome and contrasted his lot with that of other boys who had more “mothering” and home life. This feeling of childhood neglect was much in his mind during the first part of his hospital stay, although associated with no bitterness. As he grew older, relations with the father and mother were cordial and intimate, and after he was married both looked to him for advice and depended on him in many ways.

As a boy he conformed to the conventional American type. He was active and mischievous, popular with his mates, excelled in games, and obtained passing grades in school. He had a somewhat exaggerated passion for collecting, which continued to manhood. He got into various minor difficulties in the neighborhood and school, but none of them were of serious order. A special interest in caves was another of his traits, and he often came home covered with dirt after his explorations. With the girls of his set, during high school days, he was boisterous rather than gallant, and was considered by them as something of a “smart Aleck.” As a young man he was sociable, jovial and talkative, fond of practical jokes, liked a house full of company, and was the center of any merriment. He attended an eastern college, and graduated from the technical department at the age of twenty-two. While there he fitted well in every way, but was too busy with the usual outside interests to be a brilliant student.

The next three years he spent in the tropics, first as agent for a large New York firm, and later in business for himself. He had, during that time, much independence and authority, was successful in his ventures, enjoyed the frontier life, and looked back upon the

period as the most satisfactory of his professional career. He returned to the United States, against his own will, to please his future wife. For the next six years he held a number of positions, each change meaning progress for himself. During the nine years preceding hospital admission he was with one company. The years of the war brought him great responsibility and some danger. He was in a number of accidents and fires, suffered once from a mild concussion, and again, directed the rescue of men trapped in a burning building, and was long haunted by the memory of their suffering before medical aid could be obtained.

His marriage followed a love affair beginning in high school. The wife's family considered themselves above the patient socially, and opposed the match. It was only after many lovers' vicissitudes and romantic episodes that he was successful in his suit. The couple soon were forgiven, and relations between all members of the family became and remained wholly friendly. Mr. B. retained a feeling of active gratitude for his good fortune in marriage, had a strong sense of his wife's moral superiority, and never overcame an uneasy self-reproach for his own indulgent youth. After marriage, he became more serious in his attitudes, and developed a tendency to worry over minor matters. His choice was for quiet home life, rather than social activity. He was consistently public-spirited, and always had some sort of outside responsibility—often more than his wife felt was wise. He was active in church work, particularly on the financial side; connected with the Boy Scout organization and Y. M. C. A., and interested in various charities. In spite of these characteristics of the substantial citizen, there was a marked adventuresome streak in his nature which had never been wholly stilled. It is probable that if single he would have been a wanderer in the pioneer lands where his profession and experience gave excuse and opportunity.

In business he was a steady, hard worker, though he could not be called brilliant. He was ambitious to do his work well, rather over-conscientious, inclined to assume more than his share of responsibility, and had a resulting reputation of being easily imposed upon by others. The wife emphasized his habit of dissatisfaction and grievance with his business superiors, and was convinced that the trait had been a serious handicap to his business success. He never quarreled directly with these men, but would come home from work day after day and talk for hours of the unfair treatment he received. His emotion never went beyond mild resentment.

His general state of depression and uneasiness, with difficulty of applying himself to his work, had been present for the two years

since the Armistice. His associates noticed his condition, and the summer before admission he was given a three months' vacation. On his return he seemed as well as ever for a time, but soon lapsed. He was anxious, worried, and undecided. In the morning he was tired, and work seemed repugnant. Telephoning and dictating letters were particularly difficult. At home, he kept to himself, and was easily irritated by the children. Three days before admission he came home more depressed than ever; stated that he had made some deplorable mistake in the business, and that he would be discharged. He was tense, agitated, and self-depreciatory. The next day he did not wish his wife to leave him, and followed her from room to room. It was quite evident that he needed care. A company official corroborated Mr. B.'s own feeling about his business inadequacy, and stated that during the previous year he would give orders and then forget them, had neither decision nor initiative, evaded meeting issues, and made compromises. For these reasons the company had decided not to keep him in their employ.

Status on Admission. The clinical picture presented by the patient was one of mild depression, for the most part under complete control, and without surface indications of mental unrest. He talked freely in interviews, and never showed any thinking difficulty. He described his mental symptoms in well-chosen words, and without attempt to elaborate. He stated that for at least five years, underneath his real domestic happiness and apparently reasonable success in business, there had been an undercurrent of lack of interest and hope, combined with a vague, unattached apprehensiveness. He desired more and more to keep to himself and shunned his friends.

His feelings about his wife's unfaithfulness seemed to bear no definite relation to these symptoms as a causal factor. He initiated the latter topic in a rather shamefaced way, and at first tried to take the attitude that it was a thing of the past, but returned to it again and again, showing it was ever present. It strangely did not seem to affect in any way his surface relations with his wife, which were always cordial and confident. The idea first came to his mind when she showed him a picture of a group of travelers in which she was smiling at a male companion. He was able to banish the idea, and it recurred only briefly and intermittently up to three years before. At that time he noticed some ecchymotic spots on her breast after she returned from a brief visit, and fancied they might be the result of sexual trauma. He found himself listening to her telephone calls, and viewing her correspondence by mail with a gnawing suspicion. The thought of having detectives follow her had come to his mind.

For a year he kept these suspicious to himself, and brooded over them—especially at night. He then confessed to his wife, who, realizing his condition, met his questioning in a common-sense way, and felt she had convinced him of the baselessness of his charges. He never referred to the matter, with her, again, but his relief was only temporary.

He denied any feeling of muscular fatigue and all physical symptoms except some mild indigestion, with occasional troublesome rectal tenesmus. There was no loss of weight or sleep disturbance. He discussed his lifelong trait of finding grievance against others, and said his wife was wholly correct in her statement to that effect. Physical examination was negative except for some minor tremors and the presence of two teeth with apical abscesses, which were extracted while he was in the hospital. Laboratory findings, including blood Wassermann, were negative.

SUMMARY OF ANALYSIS

The patient was seen an hour a day during the first five weeks, and less frequently afterward. In makeup, he was quite frankly an extrovert, and although wholly coöperative, found introspection and investigation of his own deeper self somewhat difficult. His tendency was toward self-disparagement, and emphasis of his weak points. It was of interest to note his reactions, when the analyst outlined the general principles of normal emotional development, were to refer and interpret matters in application to his young son rather than himself. His childhood memories were at first exceedingly limited, but as time went on, more and more facts were brought out. His simplicity and terseness of language were marked, and at no time was he at all productive in the discussions held. He also had great difficulty in free association, although it was possible to get enough out of some of his dreams to give substantial aid in working out the roots of his difficulties. The physician being new to the technique of analytical therapy, paid little attention to resistance and transference. The reëducational side was emphasized, and there was considerable lecture-room explanation of psychopathological principles involved.

On the whole, the patient, as a boy and young man, was rather reckless, lawless, and impulsive, though he got into no serious difficulties. His home was the center, and he was the leader of a gang of boys organized as American Indians. Surreptitious reading of the dime novel of the period comprised part of their activities. He was once arrested and paroled following some practical joke. He

was a frequenter at a camp maintained by hoboes outside the town. He apparently received no particular injury from this association, but was fascinated by the free life and tales of adventure. A certain timidity, rather out of harmony with his other traits, was present throughout his boyhood. He avoided fights and was afraid of all things mysterious till well into high school days. He once unceremoniously deserted a girl companion when frightened by boys dressed in ghostly garb. This timidity did not imply real cowardice, as all through his adult life he had met serious emergencies in a wholly manly way. Through college he dissipated periodically in a rather reckless manner, showing on some occasions a lack of ordinary cautiousness and common sense. During his early career in the Tropics, he was care-free, worked hard, made money easily, and was a good spender. He continued a considerable degree of dissipation.

There was nothing in his relations with his parents to throw much light on his special symptoms. There appeared to be neither dependence nor antagonism in his attitude toward them. The sense of grievance which he held concerning his childhood deprivations dealt chiefly with the fact that he received too little discipline and training. There was some evidence to show that this was a defense mechanism, by which he attempted to put responsibility for present personality defects onto past neglect. There were shown other compensatory mechanisms in his relationship with his own children, which he soon grasped of his own accord. He had been somewhat oversolicitous in giving them the oversight which he felt he did not get himself, and admitted that this frequently approached the nagging quality.

He had never had any sex instruction by parents or teachers, and remembered little of the development of sex knowledge. He had a vague recollection of homosexual liberties taken by an adult neighbor who on several occasions handled his genitals, and of an assault of some sort by a negro nurse in his very early years. The former incidents seemed to possess little emotional value, but the latter came occasionally to his mind in free associations, although memory of detail never became clear. The episode may have been connected with a special aversion to colored people which he possessed. He passed through an unimportant period of autoerotism in his teens. From seventeen to twenty-five he was heterosexually rather promiscuous, but from the time of his engagement stopped this practice abruptly and without apparent effort. His wife was quite strict in regard to some of his early habits, but took his sexual purity for granted. This trust in him produced a deep sense of unworthiness and humbleness

of spirit, to which he had never made a quite satisfactory adjustment. From time to time the feeling would come to him that he should confess his past to her in detail, but had never done so. The possible effects of venereal disease had caused him much uneasiness, but the reassurance of physicians who had examined him had relieved this anxiety.

His married life, barring his obsessions, appeared to be as near ideal as possible for such relationship. The husband and wife were congenial in every way, absorbed in their home and children, and understanding of each other. Sex relations were wholly normal and satisfactory. There had been times when some special episode or affectionate demonstration of a friend toward his wife had caused jealousy, and he was free to admit that if she had displayed the slightest sentimental interest in other men, he would probably have always appeared as a jealous husband. It was interesting to note that at the time he was first assailed by doubt and question of his wife's faithfulness, he was living in Cuba, and she had just stepped off the boat to greet him after a visit of several months to her old home. During her absence he had consorted with rather fast-living business companions. Many evenings were spent at disreputable houses in the red light district. He had joined in the general gayety and enjoyed it, but drank very little, and remained wholly continent sexually. His standards for conduct in the latter respect were so rigid and repression of polygamous passion so complete that he was unconscious of the slightest desire for intimacy with other women than his wife. As an example may be mentioned a later incident in New York, when he was a member of a business organization entertained by an elaborate banquet, followed by a night at a house of ill-fame. Mr. B. stayed by the party till the following day, consuming his share of liquor, but arranging, without the knowledge of his associates, to spend the night alone. He denied any shadow of desire for female company.

To summarize once more his symptoms, it may be said that underneath material prosperity and domestic happiness, had been a growing sense of discontent. The only times in his business career when he had been happy were while in tropical service. There an unusual setting and his own position of authority had no doubt been contributing factors. In all other positions he had developed a sense of injury toward someone, usually a superior, which had reached the intensity of an obsession. Usually the men against whom he felt intensely were of the powerful, dictatorial type, or else were given by circumstance a position which he felt they were not competent to

hold. He frequently brooded over these matters at night, and thought out conversations he would hold with various men the next day, but was never able to carry them out when opportunity came. A noisy altercation, or a loud criticism in business relationships, was quite intolerable to him. The general picture presented in the account of his present illness, including the obsessive suspicions against his wife, developed on such a background. His repugnance toward telephoning, traveling on street cars and writing letters, were a portion of the general symptom picture of an anxious depression. He would often walk a mile to avoid writing or telephoning. For a year or so there had been a recurring persistent thought that if he burned down the plant, his business responsibilities would be over. He stated frankly that he recognized the outcome might be "insanity" or self-inflicted injury, if these feelings continued their gradually increasing development. He had, however, never seriously contemplated suicide.

After a month in the hospital, he made a short visit home, and returned discouraged, showing but superficial insight in the attempt which had been made to bring some of his unconscious factors into to foreground. He confessed to a complete recurrence of the feelings of doubt and jealousy. From that time on, a more aggressive type of reëducational analysis was carried on. His difficulties were outlined as taking place on three different planes: (1) Physical factors of chronic exhaustion and toxemia. (2) A conflict between his higher and lower selves in the ordinary sense of those terms, much of the conflict being repressed into the unconscious. (3) Disorder of the deeper phases of psychosexual development and attitudes.

The importance of the first, or physical, plane was minimized. He was told that application of ordinary rules of physical hygiene would take care of the fatigue factors, and that there was nothing of importance wrong with his physical machinery. The focus of infection found in relation to the teeth was not emphasized as a direct factor in his psychosis.

In dealing with factors on the second plane, it was explained to him that the normal struggle between the higher social strivings and the more primitive animal cravings was less satisfactorily solved in his case than in that of the average man of his class. The reckless, passionate, self-indulgent trends of his nature were strongly in evidence in his history, and there were still indications that much in his makeup would have been satisfied by a primitive existence, free from the obligation of civilized standards of behavior. In opposition to these tendencies, he had swung in the other direction, and set up for himself an unusually high ego ideal. This included sexual purity,

a strong sense of the duties of citizenship, many altruistic interests, and an earnest desire for general service. While part of these trends might have represented compensatory mechanisms, it appeared that there were also present fundamental spiritual and moral strivings. In connection with his engagement and marriage, the general circumstances—together with certain psychological factors within himself—suddenly and powerfully reinforced the more social side of his nature. In an attempt to adjust his personality to the new standard, an amount of repression was applied to disharmonious material which produced a satisfactory solution on the surface, but left something of chaos in the depths. Many factors brought out in the interviews convinced the physician of the truth of such a hypothesis. The example already mentioned of the patient's complete lack of polygamous sex interest, under circumstances where such an attitude could hardly be possible in a normal individual, and into which he had deliberately entered, was one of the leads which tended to show that an unusual degree of repression was in operation. It seemed likely that the result of such repression was an active, unsolved conflict, which operated in a way to give him feelings of uneasiness and inferiority with resulting symptom formation. He appeared to understand the explanation, and soon spontaneously made contributions, interpreting certain special symptoms and traits along such lines.

The difficulties taking place on the third plane, in relation to psychosexual development, were approached hesitatingly, feeling that in a man of his type possibly harm rather than good might result. Such hesitation proved unwarranted. When once he grasped the significance of the general mechanisms presented in discussion, he began to apply them to himself, and there followed a general sense of relief, accompanied by the disappearance of the more definite obsessive symptoms. Without going into details by which such a conclusion was reached, there was evidence brought out to show unconscious homosexual trends which were connected with his feelings of inferiority and desire to compensate. The paranoid and jealousy features, reasoning *a priori* in accordance with Freud's hypothesis concerning the mechanisms in such conditions, first pointed to this origin. A study of dreams appeared to bear it out. Some special attitudes in relation to other men, at times submissive, at times stubbornly hostile, fitted into the picture.

Hints of developing insight were shown as follows: At the end of the sixth week, he said: "Can it be that my dislike for other people has been really due to the fact that I wanted to get away from

that particular place?" A week later he began an interview with "Can it be that these foolish jealousies of my wife were due to the fact that I was getting dissatisfied with her in some unconscious strata of my nature?" Shortly afterward, he stated with great earnestness that he was "getting hold of some of his own mental mechanisms." He asked if his obsessions over telephoning and letter writing might be connected with the suspicions he had when his wife used those means for communicating with her friends. He told again of straining his ears to listen to her telephone conversations, and his temptation to open her letters. A few weeks before his discharge, he stated with deep conviction: "Something has taken place within me." He then related that his wife had written that she was to take one of the children to a dentist in a neighboring city, and for the first time in years he was free from doubt and haunting suspicion that something might be wrong. Independent of the literal truth of his explanations, these and similar questions and statements showed a healthy tendency to self-analysis, and that he had begun to face the real source of his trouble, which lay within himself.

The following dreams, among others, seemed to throw light on unconscious mental processes and psychosexual conflict. All three occurred during the first few weeks of his hospital stay, and the last two on the same night.

First Dream: *"In a house. A cat came in and lay on its back, kicking up its heels, and was playing with somebody else. I attempted to do this likewise, when the cat got angry with me. I felt I wished to beat it up and conquer it. I seemed to want to beat it seven times."*

A liberal interpretation, based on the associations, together with the use of some standard symbolization, permitted the assumption that the dream represented a feeling of deep-seated biological sex inferiority. Nothing could be made of the number seven.

Second Dream: *"I was in bed, and a lot of other fellows were in the room, when a man who resembled Mr. ——— (another patient) came into the room. The man kissed his wife, who was quite young and pretty, and then went into a closet and took off his pants, and jumped into bed beside me. He then tried to play with me, which I resented, and finally pushed him out of the bed."*

In the associations, the room recalled one in his childhood home, and the crowd of fellows brought back certain times when groups of boys came up there to masturbate. In connection with the man kissing his wife, he remembered his own jealous annoyance, when his employer, on leave-taking after a social call, had kissed Mrs. B. The

man in the dream, after a roundabout association, was identified with the patient's father. In interpretation, the homosexual trend was evident, complicated by intricate family relationships.

Third Dream: *"I was sitting in a house with Mrs. B., when I heard someone knocking at the front door. My wife opened the door, and I followed her. A man came in, apparently out of his head, and carrying a rifle. About this time, Mrs. B. had got hold of an unloaded shotgun, which she handed to me. The man came in and sat down. There was another man sitting there, who said he was the crazy man's brother. About this time another man knocked and came in, saying he wished to see Mrs. B. At first I resented this, but finally went back to talk to the two men in the front of the house, while the last man who came in, who was tall and had light hair, went to the back of the house to talk with Mrs. B."*

In associations, the light-haired gentleman was identified with the analyst. The general associations, with again some use of standard symbols, appeared to make the assumption of sense of sex inferiority justifiable. Added to this was a possible favorable indication in the latter part of the dream that, through the offices of the analyst, a new confidence was to be established.

After two months at the hospital, Mr. B. was called home by serious illness in the family. He met the situation adequately, in spite of many complications. He returned later for a week, and reviewed with the physician his progress. His economic future was anything but bright. It practically meant starting over at the beginning, and he had few resources. On leaving the hospital, he showed a fair degree of courage and optimism, but none of the swing of mood to unwarranted buoyancy occasionally seen after a depression. The next year was a trying one, both in financial and other ways. In times of special stress, his depression and obsessions would occasionally appear, but he was able to dismiss them promptly. At the end of a year he got on his feet in a business way, entering into a partnership, and thus avoiding some of the unpleasant features of a salaried position. Reports after two years showed complete and satisfactory recovery in every respect.

SOCIETY PROCEEDINGS

NEW YORK NEUROLOGICAL SOCIETY

THE FOUR HUNDRED AND TWELFTH REGULAR MEETING, APRIL 1,
1924. THE PRESIDENT, DR. E. G. ZABRISKIE, PRESIDING.

INJURY TO THE CERVICAL ROOTS AND CORD WITH CENTRAL PAIN

DR. GEORGE H. HYSLOP (by invitation)

The patient a woman, thirty-six years old, was injured in an automobile accident. She was in a hospital for a week, had severe pain in the back and right side of the neck, and right shoulder. Movement aggravated this pain. There was also a sharp constant pain just below the right breast, extending from the mid line in front to the mid line posteriorly on the right side. She does not recall any bruising or swelling of the right side of the neck above the clavicle, but there were large bruises from the right shoulder down to the wrist. The pain in the right side of the chest gradually diminished and was no longer troublesome 15 months later. Ever since the injury there have been attacks of pain occurring several times a week without any discoverable exciting cause, such as fatigue, excitement or use of the right arm. The order of events in these spells is as follows: (1) Pain in the back of the upper part of the neck, a sensation of coldness and of "running water" across the right shoulder and pain down the right arm; (2) Pain like a toothache in the third and fourth fingers of the right hand and third and fourth toes of the right foot; (3) The third and fourth fingers of the right hand become white and cold; (4) Weakness of the right hand so that any object being held in it is suddenly dropped.

During one attack I observed weakness of the hand and wrist muscles, most marked in the finger and wrist flexors. Station and gait were normal. There was no rigidity of the spine.

Neurological examination showed right hand and arm actually normal. The tendon reflexes of the right arm were equal to those of the left arm although on some occasions the right biceps and supinator jerks seemed less active than those on the left. There was tenderness over the fourth, fifth, sixth and seventh cervical vertebrae and also over the fourth and fifth dorsal vertebrae. The objective sensory finding were confused by functional overflow phenomena.

On repeated examinations the following abnormalities seemed fairly constant: 1. Slight diminution of all forms of sensation—touch, pin-prick, temperature and vibratory sensibility—on

the dorsum of the right hand, especially on the inner half and dorsum of the forearm about in the zone supplied by the sixth and seventh cervical segments. These deviations from the normal were present when there was no pain. During an attack of pain the area of diminished sensibility was more extensive. There was hyperesthesia over the posterior part of the right shoulder and also, roughly over the right trapezius muscle in the area supplied by the third and fourth cervical nerves. As soon as painful stimuli were applied in this area a patch of goose-flesh appeared over the outer and posterior aspects of the right arm from the shoulder nearly to the elbow. This goose-flesh persisted as long as painful stimuli were continued and faded out gradually in about 5 seconds after stimuli ceased. This goose-flesh was observed to appear spontaneously once or twice. Blood pressure was equal in both arms.

X-ray examination by Dr. Lewis Gregory Cole showed the following: 1. "Plates of the spine show all the cervical vertebrae distinctly. The bodies of these vertebrae as observed in the lateral direction are normal in size, shape, and alignment and the spacing between them is adequate, indicating that there is no destruction of the intervertebral discs. In the oblique direction, the intervertebral foramina are shown distinctly and the second and third intervertebral foramina, which transmit the fourth and fifth nerve roots, are distinctly smaller than normal compared with those above and below. 2. The dorsal spine and the lower cervical spine in the antero-posterior direction are shown distinctly. The bodies of the vertebrae are normal in size, shape and alignment. The spacing between them is adequate, indicating that there is no destruction of the intervertebral disc. There is a very slight curvature in the mid dorsal region and there is a slight tendency to a lipping and bridging between the vertebrae; this is observed in both antero-posterior and lateral directions, particularly laterally.

An accurate localization and description of the pathology present in this case is difficult. From the objective standpoint, there are the following points of importance: (1) The goose-flesh phenomenon; (2) The temporary swelling of the right hand after a pain attack (This was observed by me on one occasion); (3) The coldness, pallor and weakness of the right third and fourth fingers during a pain attack; (4) The constant tenderness in two areas of the spine.

In the history the following points may be linked with the above mentioned objective findings:

1. The occurrence of attacks during sleep causing the patient to awaken.

2. The order of appearance of symptoms during an attack.

3. Involvement of the toes during an attack.

I do not believe that the findings or the history indicate that there has been an injury either to the brachial plexus or the nerve trunks before they combine to form the plexus. An injury to the plexus or nerve trunks sufficient to produce the present symptomatology would have caused, originally, a complete loss of sensation and also more or less paralysis in the areas supplied by the injured trunks.

It should be noted that the patient did not complain of a weakness of the arm immediately after the injury was received.

In differentiating a lesion of the posterior roots and meninges from an independent or accompanying lesion in the central part of the spinal cord, the problem is quite difficult. I am inclined to the opinion that during the accident the patient received direct or indirect trauma to the vertebral column and that the degree of violence was sufficient to produce a lesion in the central part of the spinal cord which was not enough to destroy tissue but which was sufficient to have produced irritation symptoms. It is quite probable that there was also produced, at the same time, an injury to the meninges and posterior roots in the lower cervical segments. The spread of pain to the toes of the right foot would be a logical consequence of injury to the medullary portion of the spinal cord. It should be noted that the toe involvement is homolateral to the hand involvement. If the pain attacks were limited to the arm it would be unnecessary to postulate an injury to the spinal meninges or medulla. But the involvement of the toes clearly indicates that there has been some sort of lesion involving the lower cervical cord. Gordon Holmes has stated that lesions of the dorsal columns may produce central pain. I believe that at the time this patient received her injury there occurred petechial hemorrhages in the arachnoid and possibly in the dura and also in the posterior column on the right side. If the lesion were one about the central canal, or if it involved the spinothalamic pathway on the right side, one would expect the pain to be referred to the left foot. If the left spinothalamic pathway were involved, one would expect a different sort of sensory picture than was found in this patient.

The significance of the reduction in size, especially on the right side, of the 2d and 3d intervertebral foramina is open to question. It is through these foramina that the 4th and 5th cervical roots pass and in the clinical examination there was evidence of involvement of these roots—the zone of hyperesthesia and the goose-flesh phenomenon. The vasomotor disturbances in the hand and the weakness of the flexor muscles of the wrist and fingers would be associated with a lesion involving the meninges and roots in the lower cervical region and it is not necessary to postulate injury to the lower cervical nerves in the canals or in the neck. It should be noted that there have never been any objective vasomotor, sensory or motor abnormalities in the right foot.

Dr. Lewis Gregory Cole (by invitation) presented lantern slides illustrating the condition of narrowing of intervertebral foramina, with consequent compression of the nerve. Dr. Cole stated that considerable time and effort had been expended in perfecting a technique by which a roentgenogram of the foramina could be obtained; it had been impossible to get this view in the upright position and also in the prone position; finally by arranging an oblique view, it had been found possible to take a plate including the 7th or 8th cervical or first dorsal. In cases where there was an almost classical list of symptoms,—the patients complaining of pain in the shoulder, elbow and

hand, it was found that there was no pathology in these joints, but almost invariably the condition was found to be in the vertebrae where a narrow foramen caused nerve compression. The case reported by Dr. Hyslop was rather exceptional and did not present the usual findings in these cases.

Discussion. Dr. Keschner said: We neurologists send patients to the X-ray men believing that there is compression of the intervertebral foramina, but I am afraid that most of the roentgenologists have not mastered the beautiful technique shown by Dr. Cole.

Dr. E. G. Zabriskie said: I would like to recall to Dr. Cole some work done at the time of the opening of the Neurological Institute, when he presented the subject with earnest zeal and we were unable to confirm his findings. Perhaps he did not have his technique so perfect as he has now. I remember some very disappointing instances in which the symptoms were supposed to be due to compression, and which were subsequently found to be due to spinal cord tumors.

Dr. I. Abrahamson said: I should like to read the article of Dr. Gordon Holmes in full to study what other sensory phenomena were found in his case, such as might also indicate involvement of the posterior columns. In a case of gunshot wound in the neighborhood of, but not directly involving the cord substance, a case in which operation showed the cord to be macroscopically intact, severe pains in the legs were present, though all signs pointed to a lesion at the fourth dorsal segment. I should like to ask Dr. Hyslop if he recalled the existence in Dr. Holmes' case of disturbances pointing to involvement of the posterior columns.

Dr. Byron Stookey said: It seems to me that if the foramina of exit of the cervical nerves are narrowed by minute and constant bony change, a constant change of symptoms and not intermittent symptoms are to be expected. In this patient compression of the fourth and fifth roots has been predicated by reason of the narrow intervertebral foramina. It would be extremely difficult on this basis to explain the sensory findings as presented when sensory changes are present in the forearm corresponding to the seventh cervical dermatome and those of the arm and shoulder also include part of the sixth dermatome. Furthermore, the area outlined in the dorsal triangle of the neck do not correspond exactly with either the fourth or fifth or the combined area of both dermatomes. The hyperesthesia present in this area, strange to say, involves only the primary dorsal divisions of the fifth and sixth cervical nerves. If the fifth and sixth cervical nerves were compressed in the intervertebral foramina, it would seem likely that the hyperesthesia would involve not only the primary dorsal divisions but also the primary ventral divisions as well. Thus the sensory phenomena so accurately outlined and carefully studied by Dr. Hyslop do not correspond to the distribution of the nerves which makes their exit through the fourth and fifth intervertebral foramina which Dr. Cole finds narrowed in the X-ray plates.

On the motor side no atrophy and no weakness has been described corresponding to the muscular distribution of either the fourth, fifth or sixth cervical roots with the single exception that the

biceps reflex is at times altered. We know that the cervical roots which contribute to the brachial plexus are not all of equal size. It would seem probable, therefore, that we should find a normal variation and difference in the size of the intervertebral foramina through which they make their exit, the foramina being larger for the larger roots and smaller where the smaller roots are to be found.

In view of the vasomotor disturbances described by Dr. Hyslop in the fourth and fifth fingers and fourth and fifth toes, I would be rather more inclined to accept his views that the pathology is within the spinal cord. Certainly the changes found in the fourth and fifth toes cannot be accounted for by compression of the fourth and fifth cervical roots. It would be very interesting to see this patient presented at a later time after she has been further observed.

Dr. L. G. Cole (closing) said: I am sorry this is not a classical case, roentgenographically speaking, of diminution of the intervertebral foramina. Compared with others which I showed you, there is not a marked diminution. I think there is a moderate diminution. Regarding the interest of the roentgenologists, I think they are discouraged because it is a difficult position to get. We tried for a long time, first in the erect position, then in the prone, and finally found a position, which we have used for the last ten months, in which we can show down to the seventh and eighth, and perhaps the first dorsal. I think after a time roentgenologists will take up this work. They are slow getting at the different lesions. We often have this remark made to us: "I believe you are right. What can we do about it? I say that it is up to the neurologists and the orthopedic men. Neither is interested. The group of symptoms may not be neurological at all. The patient invariably asks for an X-ray examination of the hand, elbow and shoulder, and in most cases this will be found normal. The pathology is elsewhere. In four cases out of five we shall find diminution of the intervertebral foramina, on the side of the pain; there is numbness and tingling in the hand. It is an interesting thing that one intervertebral foramen can cause pressure and disturb sensory and muscle symptoms.

Dr. Hyslop (closing) said: This patient was very refractory to treatment and it has been impossible to perform any pharmacological experiments. She was first diagnosed by other physicians as having received a plexus injury on the right side. When we observed that the toes were involved it was obvious there must be some involvement of the cord. The only objective things that are constant in this patient are the patch of goose-flesh, referring to cervical five and the hyperesthesia of cervicals four and five. The intermittent phenomena of the weakness of the flexors of the wrist and the puffing of the hand I think can be separated from root injury. Since we must postulate some pathology in the cord, I think the primary focus of pathology is at the level of the fourth cervical root. I think there is a spread of impulses to the lower cervical segments. I don't understand the pain in the right toes. It is homolateral, and it is real. It is purely pain and nothing else—that is, there are no objective vasomotor disturbances. If this be due to spinothalamic involvement the

lesion must be on the left side, I suggested that the pain may be the result of posterior column involvement on the right side with a lowered threshold condition. Dr. Cole found these particular foramina involved without having read the clinical history of the case. If that is a coincidence, it is interesting. There may have been a causal relationship. I don't think it is necessary to have constant objective findings. You may have periodic neuralgia in association with lesions of the intervertebral part of the roots and also with traumatic lesions of the meninges, yet there may be in such cases intervals in which there are no symptoms whatever. We have in this case contusion of the roots, and also contusion of the cord and meninges. There may be slight glial proliferation near the central canal and in the medulla. I might mention in connection with the case presented here to-night, the instance of a man who, in 1918, was hurled several yards by a high explosive shell. He recovered consciousness in an hour or two and for two months had a paralysis of the right arm and leg. This paralysis gradually cleared up although there persisted some uncertainty in the use of the leg and a slight weakness of the right hand. In addition to these symptoms there was a persistent loss of power of erection without any change in desire. About six months ago tingling appeared in the fourth and fifth fingers of both hands. At the present time there is slight weakness and wasting of the hand intrinsic muscles on both sides, contracture of the fourth and fifth fingers in both hands and slight trophic changes. On examination one finds also a diminution of pain and temperature sensibility on the right side from the fifth cervical to the fourth or fifth thoracic segment, diminished abdominal reflexes on the right side and an exaggeration of the tendon reflexes on the right side. This man probably had, in the beginning, a contusion of the spinal cord with petechial hemorrhages in the medulla and meninges, such as have been described recently by Cornil as frequently due to lesser degrees of direct or indirect trauma. The addition of symptoms in the past six months may well be associated with glial proliferation. Gordon Holmes observed hyperesthesia to the tuning fork in the cases with pain which he attributed to a lesion in the posterior columns.

PRESENTATION OF CASES OF PARESIS EXHIBITING
SOME RESULTS OBTAINED BY TREATMENT WITH
TRYPARSAMIDE AND TREATMENT WITH
MALARIA

DRS. GEORGE H. KIRBY AND HENRY A. BUNKER, JR.

[Authors' Abstract]

Six patients were presented, four having been treated with tryparsamide and two by inoculation with malaria. All the cases had presented clinical symptoms and serological finding which left no doubt as to the diagnosis of paresis. The cases were selected from among a large number which, during the past six months, have been treated on the clinical service of the Psychiatric Institute at the

Manhattan State Hospital. In all six cases a good remission has been obtained in the sense that the psychotic symptoms have subsided, insight has been acquired, the general physical condition has improved, and the serological findings have been favorably influenced.

A brief synopsis of the four cases treated by tryparsamide follows:

1. Female, aged thirty-eight. Onset ten months before admission; with indifference, forgetfulness, and later grandiose ideas. Pupils sluggish to light, knee jerks increased, tremors present. Wassermann reaction in the blood +++++, spinal fluid +++++, in all dilutions; globulin +++, 20 cells. After three courses of treatment the patient has gained 40 pounds, the grandiose ideas have disappeared and she has good insight. Physical signs remain unchanged. The Wassermann reaction in the blood is now negative. Spinal fluid only in 1 c.c. colloidal gold curve still approximates the paretic type. Patient left the hospital after eight months' residence and has recently secured a position.

2. Male, aged forty-five. Onset a year before admission with change in disposition and later euphoria, memory defect, reckless driving of automobile and grandiose ideas. Argyll-Robertson reaction in the blood +++++; spinal fluid +++++ in all dilutions; globulin +++, 5 cells; typical paretic curve for colloidal gold. Under treatment he gained in weight and left the hospital in eight months. His grandiose ideas disappeared, his memory improved, and insight was attained. Physical signs remain the same except that speech defect is improved. Blood Wassermann is negative; spinal fluid negative in all dilutions; globulin +, 1 cell. The gold curve still retains a paretic character.

3. Male, aged thirty. Onset six months before admission with change in mood, neglect of work, forgetfulness, and finally excitement with expansive ideas. The Wassermann reaction in the blood was +++++; spinal fluid +++++ in all dilutions; globulin ++, 35 cells; paretic gold curve. Sluggish pupils, knee jerks increased, tremors. Under treatment patient gained 33 pounds and went home in six months, resumed work, has good insight. Blood Wassermann now negative; spinal fluid still positive, but less strongly so. Globulin +, colloidal gold curve no longer paretic in character.

4. Female, aged thirty-six. Onset about three years before admission with irritability, forgetfulness, and finally a paranoid trend. Tremor and speech defects were early symptoms. Wassermann reaction in the blood +++++; spinal fluid +++++, in all dilutions; globulin +++, 26 cells. Argyll-Robertson pupils, knee jerks increased, tremor and speech defect. Patient improved under treatment; gained 30 pounds, the psychotic symptoms disappeared and insight was attained. She is now ready to go home. She still shows some evidence of emotional instability and memory is not so good as it formerly was. The Wassermann reaction in the blood remains positive (++++), spinal fluid is only positive with 1 c.c.; globulin +; 0 cells. Colloidal gold curve paretic in type. Physical signs unchanged.

Two cases which have been treated by inoculations with malaria were demonstrated:

1. Male, aged twenty-nine. Onset three months before admission with forgetfulness and inattention to work. Apathy and drowsiness. Later euphoric and overactive with numerous grandiose ideas. Pupils unequal and irregular but reacted well. Wassermann in the blood + + + +, spinal fluid + + + +, in all dilutions. Globulin + +, 99 cells, gold curve strongly paretic. Was inoculated with malaria and allowed to have 10 paroxysms. The temperature ranged from 104.2 to 106. Improvement noted two weeks after completion of treatment. He gained insight, grandiose ideas disappeared, memory was unimpaired except for a period of three months preceding his improvement. Final serology showed blood Wassermann negative, spinal fluid Wassermann positive with 1 c.c. of spinal fluid, globulin + —, 12 cells, gold curve 3333321000. Physical signs unchanged. Total gain in weight since completion of treatment, 10 pounds.

2. Male, aged thirty. A year before admission he had a transient episode of excitement. For five months before admission he made indefinite complaints of indigestion. Two weeks before admission he became excited and exalted. This excitement was very marked at the time of his admission. Pupils slightly unequal, diminished reaction. Tendon reflexes active. Wassermann in the blood + + + +; spinal fluid + + + + in all dilutions; globulin + +, 11 cells; gold curve paretic type. He was inoculated with malaria. He had seven paroxysms, the temperature ranging from 103.8 to 105.8. Within a week after completion of treatment the symptoms began to subside and improvement progressed to a good remission. He has insight but only a fragmentary recollection of the first eight weeks of the period in the hospital. Final serology: Blood Wassermann negative; spinal fluid + + in 1 c.c.; globulin —, cells 3, gold curve 00122112000. Physical signs unchanged. Total weight gain since completion of malarial treatment 40 pounds.

A CASE OF MALIGNANT SPHENO-OCCIPITAL CHORDOMA

DR. JOHN L. ECKEL, OF BUFFALO

[*Author's Abstract*]

The patient, male, forty-nine at time he was admitted to the City Hospital August 28, 1923, died November 12, 1923.

History: Had measles, mumps, pneumonia, later tonsillitis, empyema with operation—recovery. Admitted gonorrhea, denied syphilis. Wife died of cancer some years ago. She was never pregnant.

Present Illness: Began in the autumn of 1921, with complaint of headache, dizziness, throbbing in head and pain in cervical portion of the spine. Examination at that time revealed numerous bad teeth and some blurring of vision, left eye. After removal of teeth vision cleared.

In August, 1923, when admitted to the hospital by ambulance he complained of inability to walk and of little power in any of the extremities. He stated that tingling and numbness, beginning in the fingers and later spreading over the arms and body, had begun eight months before. In the lower extremities it had begun in the feet, working up. At no time was there vomiting or dysphagia. There was no double vision, no choking of discs.

Examination on Admission: Smell and taste normal. Hearing and sight normal. Sensation over fifth nerve normal. There was weakness of facial muscles, lower portion, both sides, and distinct atrophy, with fibrillary tremor of tongue, both sides. Throat was relaxed. There was very little power of the extremities. The hands showed loss of pain, temperature and position sense, which extended up the arm to the elbow, but above the elbow pain and cold could be distinguished in spots. The same condition was true of the lower extremities, loss of pain, temperature, position and vibration being nearly complete to the knees and less so to the hips. Sensation was not entirely lost over the trunk. He showed indefinite extensor toe signs, left foot. He had to be catheterized and had to be fed. His pulse was 96, blood pressure 114/70, temperature normal. Hemoglobin 80, red blood cells 4,120,000, white cells 6,800. Wassermann negative in blood and spinal fluid.

X-ray showed a slight shadow at the base, which extended about the foramen magnum and apparently through it for some distance, so that a diagnosis of a probable tumor at the base of the brain was made.

While in the hospital the symptoms progressed to total paralysis of all extremities, and all forms of sensation were practically lost to the upper cervical region for three weeks prior to his death. However, he remained clear mentally. He died of lobar pneumonia November 12, 1923.

PATHOLOGICAL REPORT BY DR. W. F. JACOBS, OF BUFFALO (BY INVITATION)

Autopsy showed a brain in which the convolutions were compressed and at the base a rather flat tumor attached along the pons medulla and left hemisphere of the cerebellum. The brain was removed from it with some difficulty.

The tumor itself was shown to extend into the bone forming the base of the skull and also for some distance through the foramen magnum to the second cervical vertebra. It was smooth, glistening, encapsulated, lobulated. It measured 5 cm. antero-posteriorly by 3.5 cm. laterally, and 3 cm. thick on an average.

Histologically it proved to be a malignant chordoma. This type of tumor arises from the remains of the chordo dorsalis, a portion persisting at the junction of the spheno-occipital bone. The same type of tumor is occasionally found at the sacrococcygeal junction. In the center of the intervertebral discs it remains as the nucleus pulposus and occasionally an overgrowth of this produces a tumor mass extending from the side of the vertebral bodies.

Discussion. Dr. Abrahamson said: I should like to see the paper when published in full containing the complete clinical pictures; the discussion must, of necessity, be a fragmentary one and I shall only take up a few aspects. With a tumor situated as in the present case, the preservation of the vibratory and the deep sensibility was unusual; they are affected early and more intensely than other forms of sensation. A complete quadriplegia is very suggestive of a lesion compressing the cord at or about the region of the foramen magnum. The early occurrence of the spinal or radicular type of astereognosis bears out the observations of others in very high cervical tumors. In one of my cases of quadriplegia there was found a neuroma of the suboccipital nerve roots which invaded the foramen magnum and caused extramedullary cord compression at the level of the second and third cervical segments.

Dr. Eckel (closing) said: In reply I would state that the patient began his loss of sensation in the hands and later in the feet, which condition gradually extended up the limbs to the shoulders and hips respectively. This case was presented here in abstract; full detail of the tests will be given when the article is published.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

REGULAR MEETING MARCH 20, 1924, DR. DONALD GREGG,
SECRETARY, IN THE CHAIR

PHYSIOLOGICAL TYPES OF DISABILITY FOLLOWING BIRTH INJURY

Dr. Bronson Crothers said that the central nervous system of the foetus can be injured in any part during child-birth. Certain of these lesions involve the death of the baby through damage to the respiratory centers of the medulla and upper cord. On the other hand, it is clear that, on physiological grounds, lesions below the phrenic nuclei or above the tentorium are consistent with life and that varying syndromes may be expected.

Two important series of observations from pathological laboratories are to be considered: First, it has been established beyond question that the majority of hemorrhages within the cranial cavity are due to the effect of pressure. This can act in either of two ways. The stress of delivery may distort the head and this distortion combined with uneven intracranial pressure may cause a rupture of the tentorium at its junction with the falx. Such an injury may involve the vein of Galen or its tributaries. The series of reports starting with Beneke's paper in 1910 presents this aspect of the question in conclusive fashion. Another mechanism by which pressure can cause cerebral injury is emphasized by Schwartz. He points out that the caput succedaneum is only one manifestation of edema which involves the meninges and the brain itself.

The second series of observations is concerned with injuries of the spinal cord. The figures of Pierson who shows that the cervical spinal column was ruptured in 38 per cent of the babies who died during or after breech extraction at Sloane Hospital are enough to establish the possibility of cord injury.

The clinical importance of these observations is evident. The prognosis is clearly different depending on whether the cord is transected, or the midbrain injured, or the basal ganglia damaged or the cortex involved. Cases were presented to show: (1) Complete destruction of the lower thoracic and lumbar cord; (2) Transection, essentially complete, with reflexes maintained; (3) Injuries logically localized in the midbrain with squint and nystagmus as presenting signs; (4) Double athetosis presumably due to involvement of the basal ganglia; (5) Idiocy with spasticity which was attributed to cortical and pyramidal tract damage.

The groups which can be easily separated are: (1) Pyramidal, (2) Extrapyramidal, (3) Spinal. Of the three only the first is likely to be followed by epilepsy and feeble-mindedness. The other two lead to purely motor abnormalities. These groups are distinguishable by observation of physiological disturbances rather than by collection and study of a series of observations on conventional reflexes.

Discussion: Dr. R. L. DeNormandie: Some of us must be doing very poor work. I wish every obstetrician could see these patients. I would like to know who delivered these children so we can learn how it was done and how such results can be avoided. In my private work I have seen no such cases. I do not see how you can obviate hard deliveries.

Dr. Crothers: Theoretically, injuries at the brachial plexus and the spinal cord should never happen. In using force in delivering a child there is danger of spoiling the brachial plexus, and in wrecking the brachial plexus there is a big chance of hurting the spinal cord. Most of the obstetricians do not realize that there are two kinds of force: one is physiological, and the other—traction—is unphysiological. It seems to me they use the two motions interchangeably. If the shoulders are not coming through, they should push them out rather than draw on the head.

Dr. Gilbert Horrax: Do you see much improvement from year to year in the level of anesthesia?

Dr. Crothers: Yes, there is improvement from year to year.

Dr. Horrax: What do you do for these cord cases?

Dr. Crothers: About all we can do is to prevent infection and keep the bladders clean and prevent contraction. When the injury is subcortical, it is important to educate. One cannot sort these out until they are pretty far along. There are very few physiological injuries. One cannot have a surgical injury without danger of a malpractice suit.

Dr. Thom: How long after delivery can evidence of these injuries be made?

Dr. Crothers: If the parents say the baby is normal up to nine

months, one can practically exclude birth injury. There is always a chance of unrecognized encephalitis. I think in that mistakes are made one way as well as the other. We do not lay enough stress on intercurrent infections, etc. None of the children shown to-night have ever been normal. Most of them had convulsions after the first few days, which I think is reasonable evidence of birth injury.

END RESULTS OF OPERATIONS FOR SPINA BIFIDA AT THE CHILDREN'S HOSPITAL

BY GEORGE DAVID CUTLER (by invitation)

In order to show the importance of spina bifida at the Children's Hospital, Boston, figures covering the six-year period, 1918 to 1923 inclusive, were presented. During this time 104 patients with this condition were admitted to the hospital wards. The mortality in this group was 29.80 per cent. Only 65 of these patients were operated upon and as there were 31 deaths the operative mortality would not exceed 47.69 per cent. During this same period the records show that 122 patients with spina bifida were treated in the out-patient department: there is naturally duplication in the out-patient and ward figures as the majority of the patients were included in both departments.

Fifty-seven patients with spina bifida and 5 patients with cephalocele afford the material for study in this series, all but three of whom are included in the above mentioned figures, and the cases divided into three groups: (1) Thirty-nine patients with spina bifida treated by operation. (2) Eighteen patients with spina bifida in whom the condition was not treated by operation. (3) Five cephaloceles.

In group 1 most of the patients were operated upon before the age of four months, 19 patients were less than one month old. The division according to sex was 26 boys and 12 girls with one not recorded. There was evidence of similar defects obtained from family history in only 3 instances. There were 24 meningo-myeloceles and 15 meningoceles situated as follows: 6 cervical, 4 dorsal, 19 lumbar, 6 lumbo-sacral and 4 sacral. Twenty-three patients had paralysis but only 9 showed evidence of hydrocephalus. The technic of the operation is described and the former methods of treatment are mentioned. Of these 39 patients treated by operation 22 were discharged living, 16 dead, and in one instance the result was not known. This gives an operative mortality of 41.02 per cent, or, including the unknown as a possible death, 43.58 per cent. Hydrocephalus, meningitis, and leakage of cerebrospinal fluid were the causes of death. A follow-up on the 22 living cases showed that 7 were living and well, 5 living with complications, 4 dead, and 6 could not be traced.

Group II. The ages when first seen ranged from twelve hours to six months. There were 13 girls and 5 boys. There were 16 meningo-myeloceles and two meningoceles, all lumbar except for one in the dorsal, one in the cervical, one in the dorso-lumbar, and one in

the lumbo-sacral region. Fifteen showed paralysis; seven showed hydrocephalus. All but two were considered inoperable. The exceptions being one small lumbar meningocele, the other a cervical meningocele. In one instance a maternal aunt had spina bifida. Follow-up and end results: 10 dead, 2 living, and 6 unknown.

Group III. Made up of 4 patients with cranial meningoceles, one with a large meningo-encephalocele; all located in the region of the posterior fontanelle. The 4 meningoceles were excised. Two are well, one died of hydrocephalus and the other survived operation but developed hydrocephalus. The meningo-encephalocele was discharged untreated at parents' request and subsequently history is not known.

Conclusions:

(1) Fifty-seven patients with spina bifida and 5 patients with cephalocele afford the material for this study.

(2) The high mortality rate of spina bifida and the futility of attempting to cure the condition, in certain cases, by radical operation is again emphasized.

(3) Removal of the spina bifida sac and closure of the defect probably attacks only the effect and not the cause of the condition.

(4) We recognize, in addition to a faulty anatomical relation of tissues, the rôle which the cerebrospinal fluid mechanism undoubtedly plays in the production and behavior of the spina bifida. Clinical evidence demonstrates the safety valve action of the sac.

(5) Early radical operation may prevent deaths from infection or leakage of cerebrospinal fluid but the frequent incidence of hydrocephalus and death after removal of the sac is cause for giving a very guarded prognosis.

(6) The patients treated in this series are all under three years of age. Keen has pointed out the fact that "the mortality is higher in operations done in the first few months, 35 plus per cent against 4.7 per cent in those five years old and over. This simply means that by waiting natural causes have produced the mortality, part of which might have been attributed to surgery, and the latter has lost the opportunity of curing or improving some cases."

(7) The contraindications to operating are: Hydrocephalus, extensive paralysis and infected sacs.

(8) The mortality in the 39 patients personally treated by operation was 43.58 per cent. Hydrocephalus, meningitis and leakage of cerebrospinal fluid were responsible for the post-operative deaths.

(9) Following up the 22 patients discharged from the hospital living; 7 are living and well, 1 living improved, 4 living and have complications, six are unknown, and 4 are dead; two of these died of pneumonia.

(10) Of the 18 patients whose condition was considered inoperable 10 died, two are known to be living, and of the 6 whose condition is unknown, 2 are possibly living and 4 are probably dead.

(11) Small cephaloceles with thin membranes should be operated upon to prevent infection and leakage. There is always danger of resulting hydrocephalus after operation.

(12) The patients in this series have not been followed long enough to develop all the complications of this distressing condition. If those who are paralyzed and incontinent live long enough they are usually afflicted with cellulitis, sinuses about the buttocks and heels, and trophic ulcers. If fatal intercurrent disease does not supervene they finally die of urinary tract infection.

Discussion. Dr. Percival Bailey: Dr. Cutler has admitted that there exists in those children a defect of the normal mechanism for absorption of the cerebrospinal fluid and that he considers the meningocele as a safety valve for the absorption of fluid. From this viewpoint his operative procedure seems scarcely rational for it consists essentially in sewing up the safety valve. The result is just what one would expect—the development of a hydrocephalus.

All operative procedures should be based on a thorough understanding of the pathologic alteration which one seeks to correct. Certainly the mechanism of production of meningocele and its associated hydrocephalus are by no means understood and a thorough investigation is badly needed.

In the present state of our knowledge it would seem that one should attempt to deal first with the hydrocephalus when it can be demonstrated, and when the condition of the meningocele makes closure imperative to prevent rupture and infection, then the hydrocephalus must be dealt with secondarily as soon as it makes its appearance.

ACID BASE METABOLISM IN EPILEPSY

BY DR. JAMES L. GAMBLE (by invitation).

This was a preliminary report and is not yet ready for publication.

PSYCHIATRIC STUDIES OF YOUNG CHILDREN

Dr. Douglas A. Thom: The clinics for children of the preschool age were organized in November, 1922, with the idea of determining what the psychiatrists had to contribute to the Community Health clinics primarily interested in the physical welfare of children. Habit clinics became part of a well-organized medical group in the community and were developed throughout several sections of the city in order that they might render their service to the community in the most convenient manner. The closest coöperation was established between the various social agencies already in existence such as the Community Health Association, Family Welfare Society, child-placing agencies, Children's Aid, Children's Hospital, the nursery schools, kindergartens, and community centers. The clinics were further considered therapeutic centers and not research laboratories.

The problems presented at the clinic divide themselves rather roughly into two groups—those of undersirable habits and those of personality defects. (Numerous cases in each group were cited.)

The habit clinic idea has developed during the past two years

in and about Boston in a very satisfactory manner. The Community Health Association has accepted the mental clinics as part of its routine work. The Division of Mental Hygiene also incorporated the habit clinics into its program of preventive medicine and the city of Boston has a clinic for children of the preschool age at their health center.

There seems but little doubt that the value of such clinics has been established and that the rapidity of their development will depend only upon funds and personnel.

Discussion. Dr. Crothers: I think we do not realize what an interest the community in general takes in these problems. It was brought to our attention a week or two ago, when in response to a reference made by Dr. Evans to Dr. Thom's paper on "Fussy Food Habits", we received 150 requests for a copy. Requests came from all over, from Alaska and from Cuba, which shows the tremendous interest the mothers are taking in regard to the habits of their children.

CURRENT LITERATURE

II. SENSORI-MOTOR NEUROLOGY.

5. CEREBELLUM, THALAMUS, BASAL GANGLIA.

Walshe, F. R. M. SOME RECENT WORK ON THE SYMPTOMATOLOGY AND PATHOLOGY OF THE CORPUS STRIATUM. [Medical Science.]

This is a short review of some recent work. In previous numbers of *Medical Science* (1920, 1, 143, and 1921, 3, 353), the two earlier papers of C. and O. Vogt on the pathological anatomy of diseases of the corpus striatum have been briefly abstracted. These authors have now published a large monograph embodying the detailed description of their pathological and clinical material and their conclusions on the symptomatology of corpus striatum lesions. Thirty-three cases are described in great detail and their pathological anatomy illustrated by a large series of the most exquisite micro-photographs in photogravure. We doubt if so fine a series of photographs has ever appeared in neurological, or indeed in the whole of medical literature. Whatever further light research may ultimately throw upon the conditions they illustrate and describe, this monograph with its photographs will remain a classic in the literature of the subject. The Vogts recognize eight different types of pathological reaction on the part of the corpus striatum, though the varieties of disease processes from which they arise are much more numerous. Their latest classification of these is into the following types:

1. *État marbré* (*status marmoratus*). The characteristic clinical picture associated with this lesion is double athetosis of congenital origin, but they appear to include in their series of eight cases of this type examples to which this label cannot rightly be applied, notably Freund's case, Gustav Scholz, a congenital idiot with spastic paraplegia and inco-ordination, but, according to Freund, who studied the case clinically, no involuntary movements recalling athetosis. Foerster deals with this point in a paper to be referred to later. The lesion is an aggravated form of the "plaques fibro-myeliniques" which C. Vogt has described as normally present in the cerebral cortex, situated in the striatum (nucleus caudatus + putamen). The pallidum (globus pallidus) is relatively intact. The lesion consists in distinct and thickly scattered areas in which ganglion cells are absent, and appear to be replaced by a network of fine nerve-fibers. In Weigert specimens the condition gives the striatum a mottled appearance, hence the name *état marbré*. In addition, there is a secondary degeneration of strio-pallidal nerve-fibers. They regard the condition as a developmental defect.

2. *Stationary état fibreux (status fibrosus)*. One case is described. In this the primary lesion was an encephalitis in childhood leading to atrophy of one cerebral hemisphere. The striatum lesion was a selective nerve-cell necrosis involving the small association cells of the striatum and their fine processes. This resulted in a shrinkage of the caudate and putamen and an abnormal approximation of the persisting nerve-fibers, which gives the tissue an unduly fibrous appearance in Weigert specimens. The symptomatology included epileptiform attacks, spastic hemiparesis, and athetosis, the last mentioned being the striatum component.

3. *Progressive status fibrosus*. (a) A pure striatum lesion of the type described above occurring in non-hereditary chronic progressive chorea. (b) Associated with cortical changes in Huntington's chorea, the cortical lesions being the basis of the mental symptoms. The etiology of both types is unknown. (c) As part of the disease process in rare cases of general paralysis of the insane. The etiology in these three types is different, but the tissue reaction is identical. It does not appear that the lesion is altogether confined to the striatum, for a similar but less intense change is sometimes noted in the pallidum.

4. *État dysmyélinique (status dysmyélinatus)*. Appeals clinically as a bilateral athetosis passing ultimately into a generalized muscular rigidity. Two cases are described. The lesion begins in infancy and consists in a progressive loss of the nerve-fibers of the striate system, strio-pallidal and pallido-fugal, especially the latter.

5. *Total necrosis of the striatum*. The case they describe is one of torsion dystonia, or torsion spasm, which Thomalla has already reported. To this group, according to the authors, belongs Wilson's progressive lenticular degeneration with hepatic cirrhosis, and also the "pseudosclerosis" of German authors. The lesion begins in the putamen, spreading to the caudate and later to the pallidum. They give torsion spasm as the characteristic clinical picture, but in Wilson's cases generalized rigidity and tremor was constant, without involuntary movements of other forms.

6. *Foci of neuroglial proliferation in the striatum with presenile changes in the striate system*. A single case is described. The symptom complex included torsion spasm, athetosis, and rigidity of paralysis agitans type. There was hyaline and calcareous degeneration of the vessels of the brain, round-celled infiltration of the cortex and of the vessels of the corpus striatum. The perivascular spaces here were widened and the caudate shrunken. The putamen and pallidum were less seriously involved. In the striatum there were some areas of nerve-cell degeneration with neuroglial proliferation.

7. *État de désintégration (status disintegrationis)*. The clinical picture is that of paralysis agitans without tremor when the lesion is confined to the pallidum, but with striatum involvement tremor also makes its appearance. The lesion includes gross atrophy of the caudate from

loss of both cells and fibers, small lacunæ from hemorrhage and thrombosis, with rarefaction and absorption of tissue round the vessels. The last-named leads to the "état criblé" when small vessels are concerned and to the "état lacunaire" in the case of the larger vessels. The condition corresponds to Pierre Marie's "état lacunaire de désintégration."

8. *Gross vascular lesions of the corpus striatum.* A single case is described—one of arteriosclerosis with a softening of the striatum on one side. The patient was a dement with hemiathetosis.

In their analyses of the syndromes of the corpus striatum, the authors point out that the corpus striatum as a whole includes centers of different physiological rank and function. The striatum is the more recently developed and the more highly specialized structure, the pallidum being older phylogenetically and of lower rank. In this connection a brief reference to a paper of Elliot-Smith's on this aspect of the subject may be germane. He believes that the striatum (nucleus caudatus and putamen) is hypopallial in origin, that is, it arises from the primitive pallium by a turning in of cells on the lateral aspect of the pallium to form a cap to the paleostriatum, which latter forms a thickening on the floor of the lateral ventricle. These cells come ultimately to form the caudate, putamen, and claustrum. The lateral striate artery enters the brain in association with this pallial formation, and comes in man to be the lenticulo-striate artery, "the artery of cerebral hemorrhage." In short, the striatum (caudate + putamen) is cortical in origin. From these facts, C. and O. Vogt conclude that loss of striate activities results in involuntary movements, which are due to "released" and uncontrolled pallidal function. Loss of pallidal function, on the other hand, produces generalized rigidity, the effect of "release" of sub-pallidal motor centers. Unilateral lesions of the pallidum, however, give rise to the striatum syndrome owing to the bilateral connections of the pallidum. The presence of a lesion of the cortico-spinal or pyramidal system masks the symptoms of lesions of the corpus striatum. Their physiological conclusions may be summarized as follows: (i) The corpus striatum (striatum + pallidum) of apes and of man is identical in structure and in physiological value. (ii) There is a period after birth, before the striatum system is myelinated, when the pallidum functions are uncontrolled, and the diffuse motor activities of the new-born infant are pallidal reflex reactions. (iii) Motor impulses traveling via the cortico-spinal system do not make connection with the striate system of fibers, which (iv) receives its afferent impulses through the thalamus. (v) The striatum is a controlling organ superimposed anatomically and physiologically upon the pallidum, whose simple activities it not only controls but also refines. This control is involuntary and "automatic." Further, the striatum is the organ for the execution of associated and emotional movements, postural reactions, and flight and defense reactions. The motor defects in voluntary movement from lesions of the striatum

indicate that these activities are embodied in the voluntary motor activities mediated by the cortico-spinal system. (vi) The pallidum is the center for many primitive movement complexes. The movements of the new-born infant are manifestations of its activity. Further, it controls subpallidal centers, and the rigidity of paralysis agitans is the expression of the activity of these centers. Tremor is the result of minimal grades of striatum defect. More severe defect results in the appearance of athetosis, when the lesion occurs in early life, and in choreiform movements when disease occurs in adult life. Each of the components of the striatum and pallidum syndromes is analyzed at some length on these lines.

A detailed analysis of the clinical and pathological basis of these conclusions is impossible within the scope of this short notice, but the doubt may be expressed whether the lesions are sufficiently pure, or the symptom-complexes sufficiently constant and clear-cut, to justify the attractive simplicity of the authors' classifications, while the physiological conclusions lie under the same uncertainty. Elsewhere (cf. *Medical Science*, 1922, 6, 46) Pierre Marie has pointed out that he has examined hundreds of cases of the "état lacunaire" in which, during life, any variety of corpus striatum syndrome had been conspicuously absent. Further, the variety of symptoms which appear to follow the lesion classified as "total necrosis of the striatum," ranging from the extravagant contortions of torsion spasm to the rigidity and tremor of Wilson's disease, seems to indicate that the rigid separation of striatum and pallidum syndromes is, to say the least, premature. C. and O. Vogt suggest that the decerebrate rigidity of Sherrington may be a sub-pallidal release symptom. But, as Magnus has recorded, removal of the hemispheres, including the corpora striata in cats or dogs, does not produce either decerebrate rigidity or loss of reflex movements of associated and emotional (pseud affective) type. To produce decerebrate rigidity the anterior portion of the mid-brain must also be removed, and the rigidity resulting does not resemble the generalized rigidity of paralysis agitans, but is identical with the spasticity of pyramidal tract lesions.

In short, the physiological conclusions concerning the corpus striatum reached by the authors, and by others on a clinico-pathological basis cannot at present be brought into line with the results of experimental physiology; indeed these conclusions would probably never have been formulated had their authors acquainted themselves with the knowledge derived from the experimental physiology of the nervous system during the past twenty-five years.

Foerster's paper is a detailed analysis of striate syndromes on a clinical basis. He gives the following purely clinical classification: (1) Chorea. (2) Paralysis agitans. (3) Arteriosclerotic muscular rigidity. (4) Pseudosclerosis and progressive lenticular degeneration. (5) Athetosis. (6) Torsion spasm (cf. *Medical Science*, 1920, 2, 67). (7) Spasmodic torticollis. (8) Myoclonus. To these the Vogts would add Little's dis-

ease, but Foerster does not accept its unqualified admission, and we believe rightly, because, as he points out, the term has been used to comprehend several distinct clinical and pathological conditions. These he classifies as follows: (a) Congenital spastic paralysis of pure pyramidal type. (b) A rare form showing rigidity of pallidal type. (c) Congenital double athetosis, occurring in premature children. (d) Combined pyramidal and pallidal forms.

Foerster considers the corpus striatum syndromes under two main headings, the syndrome of the striatum and that of the pallidum. Paralysis agitans he accepts as the typical clinical counterpart of pallidal lesions, but he adds the arteriosclerotic muscular, which he himself has described, and also the Parkinsonian syndrome which may follow encephalitis lethargica.

He gives a minutely detailed description of all the symptoms of the *pallidal complex*, which may be summarized as follows:

1. Tremor at rest.
2. Increased plastic muscle tone.
3. Increased resistance to passive stretching of the rigid muscles.
4. What may be called a "shortening reaction" (Adaptationsspannung) on approximating the insertions of a muscle.
5. Tonic persistence of contraction on electrical stimulation.
6. Absence of all the reflex reactions characteristic of pyramidal tract lesions.
7. No expressional or reactive (Reaktiv-) movements. By the latter is apparently intended postural reactions to movement.
8. Limitation of voluntary movements ("Bewegungsarmut"). This includes, as component factors, slowness in initiating and completing movement, diminished range of movement, diminished force of movement, and tonic persistence of movement.
9. Loss of normal associated movements.

In his physiological analysis of this syndrome, Foerster gives a detailed account of the fiber connections of the pallidum according to the Vogts, and accepts the view, also put forward by Kinnier Wilson, that there is no direct cortico-pallidal path. He regards the pallidum as an intermediate station in a cortico-muscular efferent path, and as the efferent organ of the thalamus. The pallido-fugal fibers also enter into other physiological systems, notably, according to Foerster, in the proprioceptive cerebellar system. The syndrome includes *defect* and *release* symptoms. Among the former are loss of emotional and associated movements and postures, the slowness, the weakness, and the diminished excursion of voluntary movement. These are due to interruption of a cortico-thalamo-pallido-muscular path for voluntary motor impulses. The pallidum is concerned in the voluntary carrying out of the associated movements which normally accompany isolated purposive movements, the latter employing the pyramidal path. It is also concerned with movements of expression. Hence both are abolished in the pallidal syndrome.

The release symptoms include the tremor, the rigidity, the fixation of postures, and the anomalies of attitude. The second and third of these are reflex phenomena of proprioceptive type, according to the author, and he makes the interesting statement that *posterior root section* abolishes them, as does also a supervening tabetic process. This is a very important point, and we believe that it is the chief merit of the author to have pointed this out, for knowledge on this matter is clearly an essential preliminary to any scientific study of pallidal rigidity. He believes that normally the pallidum exerts an inhibitory action on the cerebellar proprioceptive system, and it is the removal of this influence which allows an uncontrolled overaction of the cerebellum with a resulting muscular rigidity. A similar explanation is advanced to account for the tremor. In short, the pallidum carries out associated and emotional movements and inhibits the activity of the cerebellar system.

The striatal or athetotic syndrome. Congenital double athetosis is the typical example of this. Foerster gives a detailed description of the component symptoms, which he classifies as follows: (1) Athetosis at rest. (2) Muscular atonia in the intervals between the mobile spasm. (3) A characteristic attitude ("Hockerstellung"). (4) Undue extensibility of the muscles. (5) Inconstant and variable fixation spasm. (6) Excessive emotional and reactive movements (postural reactions). (7) In any movement, the antagonists, instead of being reciprocally inhibited, go into even stronger contraction than the prime movers, and, in addition, innervation spreads abnormally to other muscle groups. As a result, a single circumscribed movement becomes impossible, and widespread athetotic disorder is added to each attempt. He points out that 2, 4, 6, 7 are directly opposite to certain components of the pallidal syndrome.

Foerster agrees with the Vogts in their classification of symptoms into striatum and pallidum syndromes on a pathological-anatomical basis, but whereas the latter compare the movements of athetosis with the diffuse movements of the new-born child, Foerster believes that they resemble the normal motor activities of climbing apes. He analyzes this supposed resemblance in some detail, and believes that in lesions of the striatum in man, the previously inhibited primitive ape-like synergies of the pallidum run riot owing to "release." He believes the striatum, on the other hand, to have specifically human functions. A difficulty then arises in explaining why apes which possess a striatum should climb and leap as their normal mode of movement, and he seeks to explain this by supposing that such a structure as the striatum may not begin to function in the animal type in which it first makes its appearance. Therefore, the striatum having developed in the common ancestor of apes and man, has remained functionless in modern apes, and has taken over its specific functions in man alone. Earnestly as these hypotheses are advanced by their author, it is impossible to take them seriously. His views as to the inactivity of the simian striatum are without any basis whatever, while

how the exquisitely coördinated motor activities of the climbing monkeys can be compared with the incoördinated writhings of the tormented musculature in a case of athetosis will be beyond the comprehension of anyone who has ever delighted in watching the amazing agility of the inhabitants of a monkey-house.

In describing the symptom-complex of *chorea*, the chief points of difference emphasized by Foerster are the rapidity of the involuntary movements and the absence of any "braking" effect from concurrent contraction of antagonists. This he attributes to a simultaneous involvement of the cerebellar system, which results in atonia.

Throughout Foerster's physiological analysis of the various components of these syndromes, we find great stress laid upon an infinitely precise localization of function within certain anatomically recognized and described nuclei and fiber systems. In this way paths and circuits of extreme complexity are composed, but throughout the whole exposition there is no convincing physiological conception of the functions thus localized. Those fundamentally important aspects of nervous system physiology which have been so frequently emphasized in this journal appear to be a closed book to the author, and for the most part he is trying to localize he knows not what. Nevertheless, in spite of the freedom with which we have felt compelled to criticize Foerster's theoretical expositions, we cannot but admire the minuteness and lucidity of his clinical descriptions, which are clearly the fruit of an exceptional experience. In this respect alone the paper merits close study. Its pages are illustrated by a unique series of 173 excellent photographs.

In his short paper on the histology of paralysis agitans and Huntington's chorea, Lewy deprecates what he considers the somewhat unduly precise notions of the Vogts. In a previously recorded series of observations on the brains of twenty cases of paralysis agitans, he did not find the lesions exclusively limited to the striate system. He believes that careful cytological studies of cases of the kind examined by the Vogts would reveal a less simple state of affairs than their studies by the Weigert method have indicated. In cases of chronic chorea, both hereditary and otherwise, Lewy finds that both striatum and pallidum are markedly shrunk, pale, and not clearly marked off from each other. The cell lesions are extreme and primary in both organs. He describes in some detail the nerve-cell changes in paralysis agitans and chronic chorea. In the former there is a general atrophy of the large cells of the pallidum. In chronic chorea, the smaller nerve-cells of the striatum are severely damaged, but so are the pallidal cells. He has also found similar changes in the cells of the cortex and in those of the cerebellum. On the whole, however, he agrees that in paralysis agitans the pallidum is predominantly involved, and in athetosis and chorea, the striatum.

The impression derived from these three studies is that a wealth of exact information as to the symptomatology and pathological anatomy of diseases of the corpus striatum is being acquired, but that knowledge is

not yet ripe for a conclusive analysis or interpretation of this. Such attempts at physiological analysis as are contained in these papers are extremely speculative, and, as we have indicated, they are, like so many attempts of the kind within recent years, not based upon modern physiological ideas. Without exception they ignore all that we have learned of the coordination of movement and posture from experimental physiology in the past twenty years, and they continually invoke the most far-fetched phylogenetic considerations. In the circumstances, it is difficult to take an optimistic view of their value. Nevertheless, the labors of these and other workers in this fascinating field are yielding information of the greatest value for all students of the problem.

Wimmer, A. PSEUDOSCLEROSIS WITHOUT LIVER DISEASE. [Hospitalstidende, Sept. 7, 1921, 64, No. 36.]

In this interesting communication the author portrays a case of degeneration of the cortical parenchyma with gliosis. The clinical picture was that of a slowly developing nervous affection in a young clerk, with disturbance in speech and gait and jerking movements, some stiffness and discoloration of the cornea, but there was no paralysis, no nystagmus and no sensory or bladder disturbance, and necropsy showed the liver apparently normal. This pseudosclerosis without changes in the liver does not fit into the frame of Wilson's disease nor of "dystonia musculorum" although, like these, some intoxication or autointoxication may have been instrumental in its development. The only thing suggesting such in this case was a few weeks of jaundice six months before. The first symptoms appeared at the age of about eighteen and a half. The jaundice may have been febrile, but there was no very severe gastrointestinal disturbance.

Comby. PROGRESSIVE DEGENERATION OF LENTICULAR NUCLEUS. [Arch. d. Méd. des Enfants, Jan., 1921, 24, No. 1, J. A. M. A.]

Comby analyzes recent literature on Wilson's disease, and comments on the solid basis already acquired. Disease of the striate body has been definitely proved to entail involuntary movements, tremor, etc., and contractures, dysphagia, dysarthria and exaggeration of the physical emotional responses, but there is no sensory, reflex or paralytic disturbance.

Wechsler, I. S. SUBSTANTIA NIGRA. [Neur. Bull., April, 1921, 3, No. 4, J. A. M. A.]

Wechsler states that from a study of the serial sections of the substantia nigra in man, in seven simians and two other animals and from a review of the comparative anatomical studies of Bauer it appears that the structure is about the same in all mammals, although it is best developed in the human. It is not at all well defined and microscopically one cannot delimit it from the tegmentum, internal geniculate, the pontine nuclei or the hypothalamic region. In some of the animals it either goes down to a lower level or reaches a higher one than in others. The

substantia nigra is found in all mammals but is said not to exist in lower vertebrates. No studies of it have been made in birds. The coördination of chewing and swallowing is only one of the numerous associational and coördinative functions of the substantia nigra.

Sjövall and Söderbergh. WILSON'S DISEASE. [Acta Medica Scand., January, 1921, 54, No. 3.]

This case already detailed clinically came to autopsy and the findings are here recorded. Some poison generated in the bowel is the best the author can offer in explanation.

Brouwer, B., and Bouman, K. H. CLINICO-HISTOPATHOLOGICAL STUDY OF PSEUDO-SCLEROSIS. [Nederl. Tijdschr. voor Geneeskunde, LXVI, June 17, 1922, p. 2465.]

The writers report to the Society of Amsterdam Neurologists a case of pseudo-sclerosis, with an account of the histopathological changes. By the term pseudo-sclerosis we understand an affection of the central nervous system characterized especially by the occurrence of strong accessory movements of the trunk and limbs, often with psychical changes and epileptiform or apoplectiform attacks, so that multiple sclerosis is simulated. Necropsy, however, fails to reveal the sclerotic plaques of that disease. But improved microscopical methods have revealed the presence of two groups of changes: (1) a noninflammatory damage of the nervous parenchyma, which occurs in many places but is greatest in the corpus striatum, and is seen also in the subthalamie region, thalamus, pons, cerebellum, and cerebral cortex; and (2) a proliferation of the neuroglia of special character; great numbers of very large hyaline glia-cells, very poor in chromatin, and many cells of peculiar shapes; and a much smaller number of large giant glia-cells of peculiar form. With all this there is found a cirrhosis of the liver that had given no ascites nor jaundice during life. A very close resemblance has during the last few years been shown to exist between pseudo-sclerosis and Wilson's progressive lenticular degeneration. Thus, the special glia-cells of Alzheimer have been now found in both diseases. Both diseases often show the same peculiar greenish or reddish-brown discoloration of the cornea and sclera; further, in Wilson's disease apoplectiform and epileptiform attacks have been seen, and pseudo-sclerosis sometimes resembles that disease in occurring in familial form. In the chronic torsion-spasm of Ziehen-Oppenheim (dystonia) we find also the chief lesion in the striatum, together with cirrhosis of liver and the presence of Alzheimer's glia-cells. Brouwer and Bouman record a case of pseudo-sclerosis: a man of twenty-six, whose parents were cousins, one of whose brothers died of infantile convulsions, and a sister of whom is rather "strange," began in October, 1919, to suffer from backache and a tired feeling; he was more irritable than formerly, and sleepy. He continued his work for some months but with little zest. In March, 1920, nothing wrong

was found; there was no urobilin or sugar in his urine. In April, 1920, he had temporary vertigo and diplopia, and then bladder symptoms and tremor in the right hand which interfered with writing. His family said that he had of late shown absolutely no interest in his surroundings and sat mostly on a chair, staring out. He was apathetic, and depressed in mood, but no signs of dementia, nor any hallucinations were present. He spoke hardly at all spontaneously. The tremor of his right arm was so great that it interfered with the physical examination; and there was a paraparesis of the lower limbs, with a right Babinski sign and thigh-clonus, the signs of pyramidal involvement being less definite on the left side. There was no true hypertonia. No dysarthria, no nystagmus nor pupil-changes, and no sensory disturbances. At first the abdominal reflexes were present. Often there was vesical incontinence. Wassermann reaction in blood was $+0.4$, negative in the spinal fluid, negative Nonne, and slight pleocytosis (41 cells). He now went down hill quickly—ataxia in legs, inability to walk, diminution of abdominal reflexes, speech more difficult, left Babinski and Rossolimo reflexes. Edema of legs came on, with epileptiform convulsive attacks affecting the left leg, and rise of temperature, and he died eight months after the onset of his first symptoms and six weeks after the tremor began. The tremor, ataxia, paraparesis with Babinski sign, bladder symptoms, with preservation of sensibility led to the diagnosis of multiple sclerosis. But necropsy revealed cirrhosis of the liver, an early stage of Laennec's cirrhosis, with much increase of the interlobular connective tissue, and here and there also of the intercellular. Many liver cells were necrotic and degenerated, and there was fatty degeneration. The spleen was large, but there was no ascites. There was chronic leptomeningitis and internal hydrocephalus. No evidence of pyramidal tract degeneration in the spinal cord or brain stem. In many places the Purkinje cells of the cerebellum were degenerated; many of the cells of the nucleus dentatus showed a peculiar granular degeneration of their protoplasm. On the lateral wall of the putamen there was a symmetrical crack, where the tissue was definitely spongy. In the putamen and the caudate nucleus (*i.e.*, the neostriatum) the large and the medium-sized cells had well nigh gone; those preserved showed a peculiar granular degeneration of their protoplasm; the glia was increased, especially the hyaline, chromatin-poor, glia cells of Alzheimer. In the globus pallidus the changes were much less deep, yet many of its large cells showed lipoid degeneration. The general appearance was one of parenchymatous degeneration with abnormal glia-reaction. The thalamus showed slight cell-changes, especially in its lateral nucleus; definite fatty degeneration; glia showed no Alzheimer cells. No changes in subthalamic and infundibular regions, nor in the substantia nigra; the glia was quiescent. In many parts of the cerebral cortex Alzheimer's glia cells are seen, and also in the medullary substance. Lipoid degeneration in

many cells of the first and third frontal gyri and of the precentral gyrus; the occipital cortex was not free from changes, however. The most striking changes were those of the Betz giant cells; those present showed degeneration: swollen nuclei, badly defined cell-body, and a granular lipoid mass in the cell-body, relatively few satellite cells, nowhere any inflammation. In this case there was a combination of an extra-pyramidal motor affection with a pyramidal. The Betz giant-cells (which give origin to the fibers of the pyramidal tracts) were sufficiently involved to give a functional disturbance of those tracts (Babinski sign), but not enough to cause degeneration of their fibers. The writers think it improbable that the lesion of the corpus striatum is the primary one in this disease. We must remember that changes in numerous other parts of the nervous system occur also; the name hepatocerebral degeneration is strictly more correct than is hepatolenticular. The liver has the power of acting as a barrier against intestinal poisons; if we assume that this barrier is defective, it is not strange that the striatum suffers, for it is affected in poisoning by phosphorus, carbonic oxide, manganese, and prussic acid. But we cannot regard the hepatic cirrhosis as the sole agent; there must also be a predisposition on the side of the central nervous system. The writers lean towards Hall's theory that both the liver and the central nervous system are in this disease endogenously feeble; the familial character of the disease favors this. [Leonard J. Kidd, London, England.]

Howe, Hubert S. DYSTONIA MUSCULORUM DEFORMANS. [Neurological Bulletin, 1921, III, 253.]

Howe describes a case of dystonia musculorum deformans in a girl of fourteen. When eight years of age, five months after an attack of scarlet fever, without any premonitory symptoms, a spasmodic shrugging of the shoulders commenced, followed in a short time by a turning in of the left foot and stiffening of the muscles of the toes and foot. The muscles of the back became weak and the trunk bent forward. Gradually she stopped shrugging her shoulders and her foot had short periods of being relaxed. It was said that nine months after the onset there were involuntary ocular movements. She gradually lost control of her legs at this time and her voice began to quaver. In six months the change in voice was so marked that strangers could not understand her, a condition which persisted for over three years and then improved. The weakness increased in the legs, however, and soon spread to the arms, neck and back. For about a year she had no control whatever over her arms, though later she regained partial control of them and of her head. At the time she came under Howe's observation, her head and extremities were in constant motion. The body was deformed and misshapen; there was thoracic scoliosis and some kyphosis. Dysarthria was marked. There were tonic, twisting, torsion movements of large muscle groups, involving mainly the trunk

and proximal portions of the extremities, present also in the hands and feet but not in the face or eyes. The muscular power was under control of the will. The tone varied from extreme tension to flaccid relaxation. There was no subjective pain.

The case was of interest for several reasons: Nearly all of the recorded patients have been Jews, this patient's mother only was of Jewish blood. In most instances the first disturbance has been in one of the lower extremities, while this patient's symptoms commenced in the trunk with a shrugging of the shoulders. In but few of the reported cases has the musculature innervated by the cranial nerves been disturbed. In those of Bernstein and Keschner there were speech disturbances supposedly due to a dystonic condition of the muscles concerned in articulation. In Hunt's discussion of Bernstein's case he states his belief that the dysarthria was secondary to involvement of the neck muscles. In Kershner's case there were involuntary rolling movements of the tongue which became more marked on attempts to speak. In Howe's patient the speech became almost unintelligible, persisted so for over three years and then improved. There were said to have been involuntary ocular movements, but they were present but a short time and not while the patient was under Howe's observation. [Author's abstract.]

de Teyssieu, Molin, and Massé. SYMMETRICAL LACUNAR FOCI OF THE CORPUS STRIATUM WITHOUT MOTOR SYMPTOMS. [Journ. de Méd. de Bordeaux, December 10, 1921, p. 574.]

The writers showed the brain of a woman aged fifty-six, who during life had suffered from mental dissociation, of chronic course, without any true dementia. She died from cardiac insufficiency. She had been long under observation at the Psychiatric Clinic and had never shown the slightest evidence of any disturbance of language nor any motor affection. Necropsy revealed atrophic cirrhosis of the liver. In both cerebral hemispheres the putamen showed two large old lacunar foci. [LEONARD J. KIDD, London, England.]

Crothers, B. LESIONS OF THE CORPUS STRIATUM IN CHILDHOOD. [American Journal of Diseases of Children, August, 1921, Vol. XXII, pp. 145-165.]

This paper deals with a group of cases showing disorders of associated movement which appear to be due to lesions of the basal ganglia. None are confirmed by post-mortem examination. The cases show various types of disorder. One child of ten shows rigidity and tremor and various involuntary movements. In this case the lesion is obviously progressive, and a tentative diagnosis of Wilson's syndrome is made. Two other progressive cases, far less definite, are described where vague choreiform movements and marked speech defects dominate the picture. The remaining cases are congenital and presumably are due to birth

hemorrhages. These children show varying combinations of spasticity and of disturbed control of associated movements. In considering these cases the author emphasizes the inadequacy of the present nomenclature. Some of these children show more or less typical evidence of interruption of the pyramidal tracts, but in all of them the disabling element is defective control of associated movement. From the point of view of treatment, it appears to be clear that the most promising procedure is to attempt to teach useful stereotyped movements which can compensate for defective associated movements. Furthermore, the author believes that certain cases can be picked out of the ill-assorted group of cerebral palsies, which are not suited for operative treatment. Another reason for attempting to divide these children into more definite groups is that, by so doing, mental classification is encouraged. Obviously the characteristic features of basal ganglia lesions, impassive face, speech defects and disturbed motility, suggest mental abnormality. Only careful investigation leads to a fair judgment in such cases. [Author's abstract.]

Oljenick, I. A CASE OF CORPUS STRIATUM LESION. [Nederl. Tijdschr v. Geneeskunde, April 22, 1922, LXVI, 1669.]

Oljenick reports to the Amsterdam Neurologists' Society a case of a corpus striatum affection in a girl of five years. She was a seven months' child; birth was precipitate and very easy, yet she was asphyxiated. Artificial feeding; no evidence of congenital lues; muscles rather flaccid. Normal development at first, with teeth at four months. But at ten months could not raise herself or sit; at this time she had a feverish attack, with pneumonia, of about a month's duration; it left her much more flacid than formerly. Gradually motor power appeared, but now it was noticed that during voluntary movements peculiar accessory movements occurred. These became more and more prominent. The child had pertussis, and often had colds and bronchitis, but otherwise no illnesses. She is very nervous, talkative, irritable, and screams and rolls her eyes at trifles. She is backward, and has restless sleep and very defective speech. She says words indistinctly in an aphonic voice, but yet she can yell loudly. No family history of importance. She lies in bed, her position being neither wholly active nor wholly passive; she often changes her position, but cannot maintain it volitionally. She is incessantly moving, her limbs being hardly ever still for a moment. General condition good. Slight convergent squint at rest; ocular movements normal. But there is occasional conjugate deviation of head and eyes to one or other side. Her face is almost always in movement; she grimaces while speaking. Her head always hangs flaccid except when any active movement is made. Arms constantly move, and show very coarse oscillations, with extension; but occasionally the arm is suddenly flexed. Choreiform movements of hands and fingers, especially on gripping. Stamping movements of lower limbs. Plantar flexion

preponderates. Enuresis. No apparent disturbance of sensibility or of sense organs. Reflexes normal, except when spasms of the limbs prevent their elicitation. Plantar reflexes flexor; upper and lower abdominal reflexes present. Neck muscles very flaccid. The tonus of the limb muscles is very variable; periods of normal, or even lowered tonus are frequently interrupted by a hypertonia that renders passive movements of joints impossible; then the flaccidity returns. The movements of the limbs are almost incessant, being often coarse, at other times choreiform or athetoid. On volitional movements very extensive accessory movements occur, thus on tongue-protrusion the limbs are raised in an extensor spasm-like condition, and sway from side to side. Suddenly patient turns head and eyes to one side so that a torsion-spasm position occurs; on the slightest active movement the whole of the body participates in the movement, *e.g.*, left arm extends, rotates outwards at shoulder joint strongly, and athetoid movements occur in hands and fingers. The child swallows well, but the action of eating is difficult, owing to the spontaneous movements. In this case there is no evidence of a pyramidal lesion; an extra-pyramidal lesion is clearly suggested by the peculiar motor symptoms. Oljenick says his case most resembles the striatum symptom-complex of Mme. Vogt: cramps and spasms of muscles accompanied by choreiform movements, tremor, associated movements, forced laughter and weeping, without, or almost without any paralytic, sensory, reflex, or intellectual disturbances. He refrains from a decision whether his case falls into group 1, of congenital dysplasia of the corpus striatum, or into group 4, of acutely occurring foci in the corpus striatum, thus in his own case a bilateral symmetrical encephalitis. [Leonard J. Kidd, London, England.]

Frets, G. P. A FOCUS OF SOFTENING IN THE FOREMOST PART OF THE NUCLEUS CAUDATUS AND PUTAMEN. [Nederlandsch Tijdschr. voor Geneeskunde, Feb. 18, 1922, LXVI, 728.]

Frets reports to the Society of South Holland Neurologists a case of softening of the foremost part of the caudate nucleus and putamen of the left side. A destitute tramp, fifty-two, was treated as an in-patient for two years: he had incontinence of urine and extremely marked flexor contracture of both hip- and knee-joints. He was confined to bed, was often dirty in his habits, and was dull and muzzy: after two years of this he was seized suddenly one evening with hematemesis and died in a few minutes. Necropsy showed pronounced arteriosclerosis of the aorta, and an aneurysm of the aortic arch, and another in the dorsal wall of the thoracic aorta that had grown into and burst into the esophagus. The flexor tendons had to be cut before the legs could be extended. At the necropsy the possibility of a striatal lesion was raised, and on sections being made the left putamen and anterior part of the left caudate nucleus showed a focus of softening; it began in front, above and to the side, was situated in the head of the caudate nucleus

in the internal capsule and in the putamen, and extended in front to beyond the foramen of Monro. No other foci were found; the globus pallidus was free; on the right side the corpus striatum was macroscopically normal; there was but little cerebral arteriosclerosis. The case is regarded as one of a fixation-contracture due to an increasing rigidity which, possibly with the urinary incontinence, was the expression of extra-pyramidal motor disturbances which were the sequel of the focus in the left corpus striatum. [Leonard J. Kidd, London, England.]

Bouman, K. H. A CASE OF PSEUDO-SCLEROSIS. [Nederlandsch Tijdschr. voor Geneeskunde, June 17, 1922, LXVI, 2471.]

Bouman has demonstrated to the Amsterdam Neurologists' Society a case of Westphal-Strümpell's pseudo-sclerosis in a healthy peasant aged twenty-six; several serious psychoses in his father's family, of undetermined nature; no lues nor alcoholism in family. For some years patient did his severe work on the land listlessly; then left home. On his return was surly, irascible, aggressive, and menacing; so he had to be admitted. He says that for two years he has noticed peculiar involuntary movements of his arms and legs; they began in his right hand, which began to tremble when he left off using his spade. Soon afterwards his right leg, and then left arm and leg, were thus affected; then his head shook, and in about a year his speech was altered. He had no other signs or symptoms, and no serious traumata nor infections. He has no ascites nor icterus. The involuntary movements in head and limbs are shock-like, very slow, but change their direction suddenly at times. They are increased by any volitional movement. When he speaks his whole body shows these shock-movements; they are worse when he is noticed, but they cease during sleep, and decrease greatly when he is kept in the dark for a time. Sometimes the shocks are seen in the muscles of face, jaws, and larynx; very much less in the tongue, but never in the eye-muscles. But all movements can be performed; there is no paresis or paralysis, and no trace of rigidity or hypertonia; there is quite good muscular power. But the finer movements are unsuitably carried out, and sometimes go entirely astray, as in writing, feeding, etc. He walks with a wide base, and walks best quickly. He is very unsteady with feet together; can do the finger-to-nose test, but he cannot keep it still on his nose owing to his suddenly increasing involuntary movements. His speech is jerky and explosive, and is not quite that of paresis or of multiple sclerosis. He complains that his face is stiff; his facial movements are not lively, but he shows a kind of grin. He cannot restrain his involuntary movements. At times there is forced laughter. He has dysphagia, but no nystagmus, no affections of sphincters, and no sensory changes of any kind anywhere. All reflexes are present, except the Achilles-jerks; the abdominal reflexes are minus. No Babinski nor any other pathological reflex. On both corneæ, especially above, there is a dirty-brown greenish discoloration. Negative

Wassermann in blood. There is euphoria and puerility; although there are no true psychotic disturbances, yet he makes a curious impression by his puerile, good-natured excitability. He has true insight into his own condition, but his mood is not in agreement with his condition in other respects. One cannot call him imbecile. He has no affection of orientation, ideation, fixation (memory), nor of his scholastic knowledge. His state does not quite agree with a diagnosis of multiple sclerosis, though it resembles it in many particulars. A study of his liver functions (by Ivens) shows evidence of hepatic insufficiency. This, when taken with the peculiar motor disturbances during rest and on intentional movements, the brownish-green corneal discoloration, and the possible familial nature of the peculiar symptoms, with complete lack of pyramidal tract lesions and of sensory changes, demonstrates clearly that the case is one of pseudo-sclerosis. [Leonard J. Kidd, London, England.]

Berger. EOSINOPHILIA OCCURRING IN CHOREA. [Am. Jour. of Dis. of Children, May, 1921, XXI, No. 5.]

The blood of forty children was examined by Berger for the number of eosinophils. The highest count was 26 per cent, the lowest 0, with a general average of 7.6 per cent. The possible relationship between eosinophilia and chorea is discussed.

Muskens, L. J. J. THE DIRECTION OF SIDEWAYS FALLING AS A LOCALIZING CEREBRAL SYMPTOM. [Psychiat. en Neurol. Bladen, 1921, Nos. 5-6, p. 414.]

An experimental lesion, in a quadruped, of one side of the corpus striatum, especially in the anterior part of the putamen or globus pallidus and their connections with the commissural nuclei, makes the animal fall to the sound side. The same rule holds good in pathological lesions in man; it is specially valuable in those cases—mostly inoperable—where the diagnosis rests between a lesion in one cerebral hemisphere and one of the opposite half of the cerebellum. The fall to one side is really a rolling round the sagittal axis. The further orally of the exit of the vestibular nerve the lesion is, the less violent is the tendency to roll; in a lesion situated orally of the posterior commissure we see only a tendency to fall; skew-deviation of the eyes is seen but seldom. In one of the cases cited by Muskens there was a right frontal tumor with falling to left; the left temporo-sphenoidal lobe was operated on, with a fatal result. In six cases (Gerstmann's) of wounds of one frontal region there was a tendency to fall. The symptom is thus of localizing value both in pathological and traumatic cases. It is absent in all those cases of pure cortical or subcortical affections in which the corpus striatum is spared. Muskens urges that in future attention should be paid to the question whether any tendency to falling to one side is present, also whether the patient can resist this tendency. From the nature of the case, the internal capsule is often involved in the lesion,

so that hemiplegia on the opposite side of the lesion is to be expected. [Leonard J. Kidd, London, England.]

Morquio, Luis. FATAL CHOREA. [Rev. Méd. del Uruguay, November, 1921, XXIV, No. 11; J. A. M. A.]

Morquio, L. FATAL CHOREA. [Arch. Españoles de Pediatría, February, 1921, V, No. 2.]

In the two cases described by Morquio, the girls of fourteen and eleven were taken suddenly with intense chorea. Only the younger child had a history of rheumatism. The intense chorea finally subsided and paralysis followed, accompanied by fever, and this progressed to a fatal termination seven and three weeks after the first onset of the chorea. Necropsy showed superficial and diffuse encephalitis. In another case the chorea developed suddenly but this yielded after a few days to the clinical picture of lethargic encephalitis. Morquio discusses the connection between chorea and epidemic encephalitis, saying that there may be a chorea disease and a chorea that is merely a syndrome. He asks, "Can cases of recurring chorea or chorea developing after a fright be explained as the flaring up of the latent virus of epidemic encephalitis?"

Morquio remarks that nothing to suggest syphilis could be discovered in a recent series of fifteen cases of chorea. He has had two cases recently of recurring chorea, the fourth and fifth attacks, in girls who have never had rheumatism or heart disease. In a boy of eleven, an attack of very severe chorea was soon followed by febrile epidemic encephalitis. In three other children, chorea of unusual severity with stormy onset gradually yielded to a paralytic condition with fever, fatal in one or two months. Necropsy revealed diffuse encephalitis, and in one case also an old endocarditis. He discusses the relations between chorea and epidemic encephalitis and articular rheumatism, and the chorea developing after a fright.

Winkler, C. HUNTINGTON'S CHOREA. [Nederl. Tijdschr. voor Geneeskunde, February 11, 1922, LXVI, 628.]

Winkler has demonstrated the macroscopic appearances of Huntington's chorea before the Amsterdam Society of Neurologists. In 1887 Stephan pointed out that in all cases of the various kinds of tremor necropsy revealed an extraordinary smallness of the basal ganglia. In 1904 Manschot showed that in paralysis agitans there occurred vascular changes in all the thalamic nuclei, in the subthalamic region, and in the globus pallidus. Winkler has invariably found smallness of the globus pallidus, subthalamic region, and lateroventral nucleus thalamic. All the arteries of the brain are extraordinarily small; but no trace of arteritis is to be found in them. The longest arteries are the most thinned. There is also atrophy of the frontal, parietal, and occipital lobes; but very much less in the temporal lobe. The corpus striatum is extremely small; and sometimes mere macroscopic examination cannot

with certainty establish its presence. The corticospinal tracts are not degenerated. In one case the lateral columns of the spinal cord appeared to be much too small. Winkler mentions that in cases of Huntington's chorea he has noticed, in addition to the oscillating movements and the progressive dementia, a high degree of muscular atony. In this disease there is apparently an inborn smallness of the cerebral arteries, and the neostriatum (putamen and caudate nucleus) seems to be usually more affected than the globus pallidus. [Leonard J. Kidd, London, England.]

de Monchy, L. B. CHOREA MOLLIS WITH APHASIA. [Nederlandsch Tijdschr. voor Geneeskunde, February 25, 1922, LXVI, 813.]

The writer has shown to the Netherlands Pædiatric Society a girl of six who had acute rheumatic arthritis, followed a week later by chorea. This cleared up in a few weeks, and she then had a very severe attack of chorea mollis. She could not sit up, had difficulty in eating and swallowing, and for six weeks could not speak a word. Occasionally she was dirty in habits. Her mood was labile, and on the least provocation became upset and lachrymose. Her muscles were very flaccid. She had had no symptoms of lethargic encephalitis, and no diplopia; there were no localizing signs for her choreic state. She recovered her speech while under bromide treatment, but she was not perfectly well again until ten months after her first attack. [Leonard J. Kidd, London, England.]

Morquio. THE KNEE JERK IN CHOREA. [Arch. Lat.-Am. d. Ped., January, 1922, 16, No. 1.]

In many individuals with chorea there is an exaggeration of the patellar reflex and a continuance of it, which the author designates an echo-reflex. Staphylococcus chorea may be separated from encephalitis chorea. In his thirty cases of the latter type observed in 1918, the chorea followed some catarrhal infectious process; the chorea was moderate and generally limited to one side of the body; the course was shorter than usual, and the termination always favorable. During 1921, chorea was rare and of the rheumatismal type.

Schoondermark, A. A PECULIAR SYNKINETIC MOVEMENT. [Nederland. Tijdschr. v. Geneeskunde, 1919, November 22, p. 1642.]

Clearly the authoress is unaware that the peculiar synkinesis she describes is the corneo-mandibular reflex described by von Sölder (Neurol. Centralblatt, 1902, p. 111). He found it in some normal persons and in coma. The writer's case was a woman, aged fifty-three, a paranoid dement who had refused food for a year. She was fed artificially, but wasted greatly. She was found one morning on the floor of an adjoining closet, dazed and pale; soon became comatose, with Cheyne-Stokes breathing. Pupils contracted; no reaction. Arm and leg jerks not obtained. Direct mechanical muscle-irritability increased.

Cystitis, urine albuminous. Death the same evening. During the coma she had normal corneo-palpebral reflexes; but, in addition, when the mouth was slightly open, a touch on either cornea gave a closure and movement of the mandible to the opposite side. But a touch on the globe through the closed lid gave no jaw-movement. Both the corneal and the corneo-mandibular reflexes persisted till the moment of death. The masseters and temporals contracted on direct contraction. There was no perceptible jaw-jerk from percussion on the finger laid on the chin. Whereas von Sölder found corneo-mandibular reflex to persist in coma sometimes when the corneo-palpebral reflex was absent, in Schoondermark's case the latter was preserved. In her case, too, the corneo-mandibular reflex was bilaterally obtained. She lays stress on the increase of mechanical muscle-irritability in her case. [LEONARD J. KIDD, London, England.]

Rogers, F. T., and Wheat, S. D. STUDIES OF THE BRAIN-STEM.

Carbon dioxide excretion after destruction of the optic thalamus, and the reflex functions of the thalamus in body temperature regulation. [Amer. Journ. Physiol., 1921, LVII, September, p. 218.]

The writers find that removal of cerebral hemispheres of pigeons, leaving the optic thalamus intact, does not appreciably alter the output of expired carbon dioxide in resting starving birds, nor does it alter their ability to regulate body temperature against atmospheric cold by increased heat formation and against warmth, by polypnea. But in pigeons rendered poikilothermous by destruction of the optic thalamus, the carbon dioxide output varies directly with the body temperature variations. If the body temperature is set to a normal level by regulation of the atmospheric temperature, the output of carbon dioxide falls within the limits of variations of normal homothermous birds. After removal of the thalamus the pigeon does not respond to atmospheric cold by increased heat production nor to warmth (36° C.) by "panting" polypnea). The writers suggest that reflex changes of skeletal muscle tone and of the sympathetic system induced by stimulation of the temperature nerves of the skin involve the thalamus as an essential part of the functional pathway. [LEONARD J. KIDD, London, England.]

Coupin, F. THE ROOF OF THE FOURTH VENTRICLE IN ICHTHYOPSIDA.

[Comp. Rend. Soc. de Biol., 1921, LXXXIV, 913, (6 figs.).]

The roof of the fourth ventricle is formed by the tela choroidea posterior. Coupin finds that in Ichthyopsida, as in the mammals examined by him, the foramina of Magendie and of Luschka have no existence; they are, in fact, artefacts. There is no communication between the fourth ventricle and the subarachnoid spaces. The tela choroidea posterior varies much in the Ichthyopsida. Thus, in *Torpedo* it is simple, in *Rays* it shows villousities that penetrate deeply into the

fourth ventricle, in frogs it is wholly visible from the surface, whereas in the carp it is partly covered by the cerebellum. In the dog-fish the fourth ventricle shows diverticula, comparable with the lateral recesses of mammals, and covered by the lateral expansions of the tela. But in all these cases the tela is perfectly continuous throughout the fourth ventricle. [LEONARD J. KIDD, London, England.]

Rogers. STUDIES IN BRAIN STEM IV. [Am. Journ. of Phys., December 1, 1920, LIV, No. 2, J. A. M. A.]

The experiments reported on by Rogers suggest that the cerebral hemispheres and thalamus exert regulating mechanism. This action is on the subcortical blood pressure regulating mechanism. This action is not one of localized cerebral centers but varies according to the amount of brain substance destroyed, rather than according to the particular area destroyed.

Leschke, E. THE MIDBRAIN. [Deut. med. Woch., September 2, 1920.]

The usually accepted pituitary destruction origin of Froelich's syndrome is here disputed. Thirty-five cases of this disease have come to necropsy and in no less than twelve the hypophysis was not affected. In the twenty-three remaining many different forms of tumors had led to dystrophia adiposogenitalis, in some cases with an increase and in other cases with a decrease of hypophysial tissue. Hence Froelich's notion is not quite sound he thinks. Leschke inclines to a more neural type of explanation in which the midbrain structures play an important rôle. In all cases of Froelich's syndrome autopsied the base of the midbrain was pathologic, even when the hypophysis was intact. Following injury of the midbrain in animal experiments genital atrophy has been observed. Exclusion of the midbrain has caused marked increase of protein metabolism, whereas stimulation of the base of the midbrain brings about a diminution. Polyphagia plays a part in affections of the midbrain.

Lhermitte, J. THE ANATOMICAL AND CLINICAL SYNDROMES OF THE CORPUS STRIATUM. [Neurol. Bull., 1921, III, 163.]

Lhermitte gives an interesting précis of the abundant literature which has been published on the symptomatology and pathology of the corpus striatum within the past few years. As such it is not readily capable of abstraction, but the paper having been published in two relatively inaccessible journals, and the subject having as yet received no similar treatment in this country, a short account of Lhermitte's review may be of value.

I. Lhermitte deals first with the gross and fine anatomy of the corpus striatum and with its fiber connections. The caudate nucleus and putamen are grouped together as the striatum, while the two inner segments of the lenticular nucleus are spoken of as the pallidum. The

term corpus striatum is employed to designate both parts of the structure together. The striatum contains nerve-cells of Golgi Types I and II. The pallidum contains Type I cells only. The latter contain both Nissl and lipochrome granules. The small Type II cells show neither. Fine fibers pass from both parts of the striatum to the pallidum, but no projection fibers leave the corpus striatum from this part of the nucleus. The axones of the large cells of the pallidum, on the other hand, form an important projection tract, the ansa lenticularis, which sends fibers to the thalamus, nucleus of Luys, red nucleus, substantia nigra, and to the region of the cerebral peduncles. Afferent fibers to the corpus striatum come from the thalamus alone. There are no fiber connections with the cerebral cortex. It appears, therefore, that the corpus striatum, completely independent of the cerebral cortex, forms an anatomically autonomous system, whose afferent fibers arise in the thalamus, and whose efferent fibers arising almost exclusively in the pallidum pass to the thalamus and to masses of gray matter in the subthalamie region.

II. Lhermitte dismisses the experimental physiology of the corpus striatum very summarily, because it has been almost uniformly negative in its results. This is undoubtedly true, but whether we are justified in believing that these negative results have no significance is another matter.

III. Anatomoclinical observations are very numerous and are the source of such information as we possess of the activities of the corpus striatum. On the basis of anatomical and histological differences it is assumed that the striatum and the pallidum are different in function. There is some clinical support for this view, and the attempt has been made to elaborate syndromes of the corpus striatum as a whole, and of the striatum and pallidum singly. Lhermitte gives the following syndromes:

A. Syndromes of the corpus striatum (striatum+pallidum).

i. Progressive lenticular degeneration (Wilson's disease). The cardinal features of this are diffuse muscular rigidity leading to a characteristic attitude and facies and ultimately to contractures, and to dysarthria, aphonia, and dysphagia. Spasmodic laughter and weeping occur and also involuntary movements of the tremor and athetosis variety. Peculiar to the disease are lesions in the viscera, hepatic cirrhosis, and sclerotic changes in spleen and pancreas. The disease develops in childhood and is often familial. The nervous lesion is atrophy and sometimes extensive cavity formation in both portions of the corpus striatum. The ansa lenticularis is markedly degenerated.

ii. Pseudosclerosis (Westphal-Strümpel). This is now regarded in Germany as identical clinically and pathologically with progressive lenticular degeneration, though Lhermitte does not altogether concur in this view. Recent histological investigations by Spielmeyer indicate that the lesion in the two instances is identical, and that we are not dealing

with a pure corpus striatum disease, although the striatal lesion predominates. A peculiar brown-green pigmentation of the periphery of the cornea is described as typical of the disease by German authors, but this has not been recorded in cases diagnosed as progressive lenticular degeneration in this country or in America.

iii. Presenile and senile pseudobulbar syndromes of the corpus striatum. A pseudobulbar syndrome of striatal origin is occasionally seen. It is characterized by attacks of uncontrollable laughter and weeping, by dysarthria, aphonia, and dysphagia, and by loss of voluntary and emotional facial movements, muscular rigidity, and fixation of attitude. Involuntary movements are absent. The lesion is that described by the Vogts as status disintegrationis.

iv. Presenile and senile Parkinsonian syndromes of the corpus striatum. These differ from paralysis agitans by the absence of tremor, or rather in its replacement by athetosis or "torsion spasm." Vascular lesions with neurological proliferation constitute the disease in these cases.

B. Pure striatum syndromes (i.e. caudatus and putamen).

i. Vogt's syndrome (Little's disease with *etat marbré* of striatum). Includes those cases of diplegia in which there are no pyramidal symptoms, but instead, muscular rigidity, involuntary associated movements and bilateral athetosis.

ii. General rigidity and progressive athetosis. This differs from the form just described in being acquired and progressive instead of congenital and regressive. The lesion is that called *status dysmyelinatus* by C. and O. Vogt. Spiller's dystonia lenticularis approximates to this form.

iii. Huntington's chorea. Here the involuntary movements are associated with diminution of muscular tone. The lesion is an atrophic corticostriate degeneration. (C. and O. Vogt.)

iv. Acute striatal lesions, Sydenham's chorea. Lhermitte suggests that the symptoms in this disease may in part be striatal in origin.

v. Vascular lesions of the striatum. Symptoms of "hemi-choreo-athetosis" without paralysis in cerebral vascular disease.

C. Pallidum syndromes. The clinical picture of paralysis agitans is characteristic of pallidal lesions. According to Ramsay Hunt, the essential lesion in juvenile paralysis agitans is a selective abiotrophic degeneration of the motor cells of the pallidum. The observation lacks confirmation and does not accord with the findings of Lhermitte or the Vogts in the adult form of the disease.

IV. Synthesis of these syndromes. The following general observations may be made for all the syndromes. The disorders are purely motor, are not paralytic, and are concerned with muscle tone, voluntary, automatic, and expressive movements. The characteristic muscular rigidity, so different from the true hypertonus of pyramidal tract lesions, is perhaps the most fundamental feature, and with the exception of

Huntington's chorea is found in all the striate syndromes. It is the cause of the vicious attitudes and of the slowness and poverty of movement. The general immobility in voluntary movement and the absence of facial gesture and of involuntary associated movements are very striking features of the syndrome. Not less important are the involuntary movements which may be either of the tremor, athetosis, or choreiform variety. There is probably no essential qualitative difference between these three, and the underlying state of muscle tone may be responsible for their differences.

Lhermitte does not discuss in detail the various elaborate and speculative hypotheses as to the functions of the corpus striatum which have been put forward, but contents himself with the general and obvious conclusion that the functions of the corpus striatum are very different from those of the pyramidal system. The latter has to do with highly differentiated movements, the former with more rudimentary automatic movement complexes, such as walking, movements of defense, and of spatial orientation; it is these which are affected by lesions of the corpus striatum. [F. M. R. WALSHE, Medical Science.]

Gerstmann, J. and Schilder, P. MOTOR DISTURBANCES OF PSEUDOSCLEROSIS. [Zeitschr. f. d. ges. Neurol., Vol. LVIII, 33.]

In a case belonging to the Wilson group of pseudosclerosis (functional indication of disease of the liver, no arcus senilis, anatomically degenerative processes in the lenticular nucleus) certain facts were established in regard to the hypertonus which were of a nature to separate the rigidity of this group from that of paralysis agitans: Above all the reflex incitation of the hypertonus and its tendency to irradiation, the possibility of bringing it quickly to disappear through passive movements. It was further established that a retardation of the movement which would not be conditioned by tensions was not present, that passive given positions could not be maintained and were not fixed through extension, that the recoil perhaps corresponded to the norm. There were established as chief signs of the tremor: Oscillation in the plane of the intended movement, irradiation to the more remote muscle fields, increase of strength toward the end of the movement and persistence after its conclusion. The increase of the tremor with the movement is likewise a characteristic distinguishing it from that of paralysis agitans. The trembling here analyzed has perhaps closer relation to the intention tremor of multiple sclerosis.

Sjövall, E. and Söderbergh, G. A CONTRIBUTION TO THE KNOWLEDGE OF THE PATHOGENESIS IN WILSON'S DISEASE. [Acta medica Scandinavica. Vol. LIV, fasc. III, 1920.]

This pathogenetical study is based upon the post-mortem analysis of the changes in liver, spleen and intestinal canal in a case of Wilson's disease, and with it is connected a critical examination of corresponding

findings in earlier published cases of this disease. The changes in liver and spleen correspond well with those of a Laënnec cirrhosis, the differences in the different cases being easily explainable as different stages of regeneration and progression in the disease. This view of the nature of the changes suggests the presence of an actiologically active toxic substance, probably originating in the intestinal canal, and the anatomical examination has justified this assumption by the establishing of striking changes of an inflammatory nature in and near the first part of the colon in the case examined (a diffuse chronic inflammation in addition to a chronic tuberculosis and a retroperitoneal increase of connective tissue on an obviously inflammatory basis).

However, the question of the pathogenesis in Wilson's disease is not summarily to be dismissed thus. The number of intestinal poisonings giving liver cirrhosis is certainly extremely small. Among the liver cirrhosis, on the other hand, still fewer show the clinical type of Wilson's disease. From these facts at least one x in the equation would seem to be given. It is conceivable that intestinal affections of different etiology may produce a quite definite but at present unknown poison, which either causes cerebral lesions by way of the liver and spleen, or else from the beginning has an affinity to all these organs. But if this were all, we should probably have to reckon with many cases of the curious disease. It seems difficult to get away from an endogenous factor, consisting in a certain chemical disposition in liver (and brain?) to the hypothetical intestinal poison. Should such a view be authorized, there would be more unity in the aspect of the hitherto apparently haphazard blending of exogenous and endogenous factors in the pathogenesis of Wilson's disease. [AUTO. REF.]

Guillain, G. A CASE OF TUMOR OF THE SPLENIUM OF THE CORPUS CALLOSUM. CONTRIBUTION TO THE STUDY OF THE SYMPTOMATOLOGY OF CORPUS CALLOSUM TUMORS. [Ann. de méd., 1922, XI, 33.]

Guillain, G. TUMOR OF THE SPLENIUM OF CORPUS CALLOSUM. [Rev. Neurol., 1922, I, 20.]

In the *Annales de Médecine*, Guillain gives a review of the clinical literature of tumors of the corpus callosum. Duret (1905) appears to have been the first to attempt to differentiate the symptom-complexes of the corpus callosum according to whether the anterior, middle, or posterior part was involved. Characteristic of all corpus callosum tumors, according to this observer, are bilateral motor weakness, predominating on one side, an absence of signs of involvement of cranial nerves at the base of the brain, and an absence of sensory changes. In tumors of the genu or anterior part, psychological disturbances are early and prominent (stupor, confusion, and dementia). Defects of speech—dysarthria and motor aphasia—and Jacksonian attacks in the muscles of the face, tongue, neck, and upper limbs are also frequent. When the

mid part is involved the same bilateral unequal motor weakness is seen, with titubation and astasia-abasia. Finally, in lesions of the splenium, the motor weakness is said to predominate in the lower limbs and to be associated with visual disturbances and ataxy of cerebellar type. Raymond (1906), discussing the mental changes, regards progressive mental deterioration as characteristic of genu tumors, and delirium and excitability of splenium lesions. Often the change in the patient's character suggested the presence of general paralysis. Raymond, Lejonne, and Lhermitte (1906) believe that mental change is the only pure corpus callosum symptom, and consists in a loss of association of ideas, eccentricities of behavior, defect of memory, especially for recent events, irritability and capriciousness, without actual delirium. In short, from a review of the extensive literature on the subject, it appears that tumors of the corpus callosum present a characteristic clinical picture in which progressive dementia and hebetude are early and prominent symptoms, apraxia is common, slight bilateral hemiplegia predominating on one side and often associated with tremor and some ataxy is the rule, while the ordinary signs of increased intracranial tension, headache, vomiting, and papilledema are later in development and tend to be less severe than in tumors elsewhere in the brain. In respect of tumors of the splenium, Guillain gives the following special symptom-complex: (i) General signs of intracranial tension occur, but are less marked than is common in cerebral tumors. (ii) Psychical disorders, such as amnesia, disorientation and confusion, emotional apathy with alternating stupor and agitation. (iii) The frequent presence of motor symptoms, bilateral weakness and spasticity, which are really due to compression of the adjacent motor paths. (iv) The occasional presence of apraxia. (v) Absence of aphasia. (vi) The absence of cranial nerve palsies. In both papers he records a case of tumor involving the splenium bilaterally. The patient was a man of fifty-two who, eight months before coming under observation, was first noticed to be changing mentally. His memory became uncertain and he made mistakes in his accounts. He suffered from violent headache and giddiness. The fundus oculi was not examined. There were no cranial nerve palsies, nor any motor symptoms. The tendon-jerks in the upper limbs were feeble and in the lower limbs were abolished. Abdominal and plantar reflexes were absent on both sides. The pupils were unequal and reacted feebly to light and to accommodation. The patient's memory was grossly defective, he could not remember his address, nor the events of the day, and was unequal to the smallest calculation. He was not paralyzed, but was unable to carry out even the simplest acts; there was marked apraxia. Examined just before death, he was somnolent, showed gross loss of association of ideas, and had periodical accesses of excitement, in which he wandered about, with some ataxy, and, from his profound loss of vision, was constantly knocking into the objects in the room. There was no paralysis, apraxia could not be investigated, but there was a fine

tremor of the right hand. Lumbar puncture revealed a clear fluid under pressure, yellow in color, free from excess of cells but rich in globulin (xanthochromia). Death occurred ten months from the first appearance of symptoms. Autopsy revealed a glioma infiltrating the splenium on both sides, and just beginning to involve the thalamus on the left. [WALSHE, Medical Science.]

Souques, Alajouanne, et Bertrand. TUMOR ARISING IN THE SEPTUM LUCIDUM, WITH SYMPTOMS OF DEMENTIA. [Rev. Neurol., 1922, I, 270.]

The patient was a woman of forty-one, who entered hospital in a state of dementia. No history of her malady was available, and no diagnosis of cerebral tumor was made during life. She was completely disoriented as to time and place, and was unable to answer the simplest questions relative to her own past life or to current events of public interest. There was no defect of speech, either of comprehension or of expression, within the narrow limits allowed by her mental state. There was incontinence of urine. No mention is made of the state of the fundi of the eyes. The cranial nerves were normal apart from inequality of the pupils, the left being larger with loss of reaction to light, the light reaction in the right was feeble, and there was slight tremor of the tongue. The patient walked slowly and tended to drag her feet. There was slight extensor rigidity of the legs. There was no weakness. No sensory loss was detected. All the reflexes were normal. The patient became slowly more demented, and died comatose with pulmonary symptoms six months after admission to hospital. Mesial sagittal section of the brain revealed the presence of a tumor, the size of a hen's egg, situated in the septum lucidum. Anteriorly, it reached to the level of the genu of the corpus callosum, and posteriorly insinuated itself between the corpus callosum and the pineal body. The lateral ventricles were widely dilated, but the third ventricle was reduced to a slit. Microscopically, the tumor proved to be a glioma undergoing cystic and calcareous degeneration. The authors have found two similar cases recorded in the literature, but no details of these are given. On the other hand, the spread of growths arising in the corpus callosum to the septum lucidum is known to occur. They believe that the concurrence of three factors in their case, namely, compression of the corpus callosum, hydrocephalus, and compression of the cerebral cortex, account for the profound dementia, though they do not attempt to estimate the relative importance of these. [WALSHE, Medical Science.]

Foix, Ch. et Fatou, E. KYPHOSCOLIOSIS AS THE INITIAL SYMPTOM IN SYRINGOMYELIA. [Rev. Neurol., 1922, I, 28.]

The authors describe two cases of syringomyelia, in both of which kyp scoliosis was present for several years before the onset of signs of spinal cord lesion. In one the spinal curve had developed painlessly

and without other symptoms at the age of fifteen. At the age of twenty-eight spastic paresis of the right leg developed. Examination revealed symptoms of a syringomyelic cavity extending throughout the length of the thoracic cord and almost entirely right-sided. There was no wasting of the upper limbs and the spinal curve had its convexity directed to the right.

The second case was that of a man of fifty-two who came under observation for chronic bronchitis, and who was found to have a kyphoscoliosis of the thoracic spine, convex to the right. The patient was not aware of any symptoms referable to the nervous system, and stated that the spinal curvature had developed painlessly and as an isolated symptom at the age of fifteen years. Examination revealed sensory loss of dissociated character corresponding to the whole extent of the thoracic cord and mainly right-sided. Beyond the presence of increased tendon-jerks and a Babinski type of plantar response on the right side, there were no other physical signs. In short, the syringomyelia was latent, except for the spinal curvature. The authors point out that both cases showed unilateral lesions of the thoracic cord, and that the convexity of the scoliosis pointed to the side of the lesion. They believe that weakness and dystrophy of the erector spinae on the right side had allowed the intact muscles of the left side to act unopposed and thus to produce the curve. Radiographic examination of the spine revealed no abnormality of the vertebrae, and they reject primary trophic lesion of the bone as the cause of the kyphoscoliosis. [WALSHE, Medical Science.]

Rehn, E. ELECTROMYOGRAPHIC STUDIES IN DISEASES OF THE CORPUS STRIATUM. [Klin. Wchnschr., 1922, I, 673.]

Gregor and Schilder have reported that the muscular rigidity of paralysis agitans is not accompanied by any current of action in the muscles, and have used the observation as an argument in favor of a supposed dual function of striated muscle, phasic and tonic contraction. They employed nonpolarizable electrodes applied to the skin over the muscle to be tested. Rehn has repeated their observations, using needle electrodes piercing the skin and applied directly to the muscle. He finds that there is a continuous electrical response in the muscle, indicating that the rigidity and the tremor of patients with paralysis agitans and other diseases of the corpus striatum is of the nature of a tetanus. In two cases of post-encephalitic paralysis agitans with rigidity and tremor, he took leads from deltoid and biceps at moments when no tremor was visible. The record revealed oscillations of two types with a rhythm of 45-50 per second, waves of small amplitude, and at a rate of 6 per second waves of large amplitude (synchronous with the clinically observed tremor, although no tremor was seen at the time). When a voluntary movement was made, both types were merged in the large oscillations of voluntary innervation. However, the rhythm was not interrupted, but remained constant—that is, 45-50 per second. In a second, the original

two-wave oscillations appeared again and continued. In the sternomastoid of one of these patients, uniformly large oscillations of the same rhythm occurred, without the small intercalated waves described above. The same was found in the pectoralis of a case of torsion spasm, but in the flexores carpi ulnaris et radialis of this patient a third form of record was obtained. A series of waves of large amplitude lasted for $\frac{3}{4}$ to $1\frac{1}{4}$ seconds and then gave place to small oscillations for a similar period—that is, groups of large and of small waves alternated. The interesting fact emerges from these observations that the tremor and rigidity give records characteristic of a tetanus, and differ from each other and from the record of voluntary innervation, not in character, but simply in amplitude, the rhythm in each instance being the same. A similar large wave-curve was obtained from a case of spastic diplegia. Further investigations are in progress. These observations appear to give no support to the view that tonic muscular contraction is subserved by a special muscular apparatus. In respect of these observations it must be remembered that the interpretation of electromyograms is beset with pitfalls. The small oscillations described by Rehn are to be found in almost every electrocardiogram, and probably arise in the skeletal musculature and not in the heart-muscle. Their amplitude in these circumstances is the resultant of several factors. When the subject is in an uncomfortable posture, is cold or apprehensive, they tend to be more marked than when he is completely in repose, warm, and free from emotional reaction, but they are seldom entirely absent. We cannot, therefore, accept as finally determined the nature and significance of these records. Whether they are directly associated with the rigidity of striatum diseases remains doubtful. [WALSHE, Medical Science.]

Souques, M. A. CONJUGAL PARALYSIS AGITANS. [Rev. Neurol., 1922, I, 302.]

The observation is of interest when read in connection with the statistics of post-encephalitic paralysis agitans recorded by Grossman and described in *Medical Science* recently (1922, VI, 311). The wife, aged fifty-two, was taken with an acute febrile illness in July, 1919. The disturbance was transient (she was confined to bed for two days only) and consisted in fever, amblyopia, and vertigo. Six months later she had a relapse, with persistent insomnia and the development of the clinical picture of paralysis agitans without tremor. The husband, aged sixty-five, since January 1920 has had an intermittent tremor of Parkinsonian type in the left arm. In both instances the symptoms are progressive. Souques regards both as examples of a post-encephalitic nervous lesion, though in the case of the husband the initial infection passed unnoticed. He gives figures relative to 102 cases of post-encephalitic nervous symptoms. Of this series, a symptomatic paralysis agitans was present in 71, choreiform and "myoclonic" involuntary movements in 18, cerebellar symptoms in 3, neurasthenic states in 3, and psychical disturbances in 7.

In two-thirds of his cases, therefore, the clinical picture of paralysis agitans developed. [WALSHE, Medical Science.]

Holmes, W. RELATION OF INCREASED BLOOD VISCOSITY TO TRANSIENT ATTACKS OF HEMIPLEGIA. [J. A. M. A., 1921, LXXVI, 1640-2.]

Holmes admits that it is difficult to prove either the angiospastic or any other theory of transient hemiplegia, but quotes two cases in which it occurred after incidents which may be supposed to have led to loss of fluid from the body. This in turn would tend to concentrate the blood, increase its viscosity, and so possibly lead to a temporary cessation of circulation through parts of the brain. He quotes as also in favor of his views the observation that intermittent claudication is much relieved by forcible administration of fluids, and mentions as favoring the occurrence of these hemiplegias the fact that elderly persons often restrict their intake of fluid owing to prostatic troubles.

Thalhimer. EPIDEMIC (LETHARGIC) ENCEPHALITIS. [Arch. Neurol. & Psych., 1921, V, 113.]

For his cultural and experimental investigations Thalhimer obtained material from four cases of epidemic encephalitis, two of the "fulminating type," one with marked "myoclonus" and one showing lethargy. The central nervous system of all had the characteristic lesions of the disease, such as capillary congestion, microscopic hemorrhages, perivascular mononuclear leucocytic infiltrations, microscopic areas of degeneration and necrosis. The two fulminating cases showed marked congestion, great numbers of capillary hemorrhages, a few areas of localized necrosis with round cell infiltration and here and there slight or marked perivascular round cell infiltration. The other two cases, which ran a longer clinical course, also showed all these lesions, but many, instead of a few, of the vessels were surrounded by round cells. The degree of this perivascular infiltration was also greater. Cerebrospinal fluid was obtained from one of the fulminating cases and from a convalescent patient who had manifested marked lethargy and still had, at the time of lumbar puncture, headache, nausea, vomiting, and a slow pulse. With this material a number of guinea pigs and about 200 rabbits were inoculated intracranially according to the method devised by Loewe. Cultures were made by means of the ascitic fluid tissue medium as perfected by Noguchi. The results obtained were identical with those reported by Loewe and Strauss and confirmatory of both their animal experiments and cultural studies. The author is therefore of the opinion that an infectious agent has been demonstrated which is apparently constantly associated with epidemic encephalitis. This infectious agent passes through a porcelain filter capable of holding back *B. prodigiosus*, the filtrate producing a disease in rabbits which is very similar to lethargic encephalitis and is characterized by microscopic brain lesions identical with those found in fatal human cases. The disease is trans-

missible in series from animal to animal even when the brain emulsions prepared for inoculation purposes are filtered through a Mandler porcelain filter after each animal passage. The infectious agent, which was grown from the brains of about 80 per cent of the rabbits inoculated with filtered virus, stains a violet-blue with methylene blue and purplish with Giemsa's fluid. It is extremely minute, rounded, and measures from one-fourth to one-fifth of the diameter of a small anhemolytic streptococcus. It is found singly, in pairs, in short chains, and groups, and stands out sharply by the usual magnification of an oil immersion lens. Cultures of this microorganism, when inoculated intracranially into rabbits, cause the same disease and the same brain lesions as the filtered brain emulsions from human cases, or successfully infected animals, and the same organism can be recovered from the central nervous system of rabbits inoculated with cultures. It is therefore believed to be the etiologic agent of epidemic encephalitis. [DA FANO, Medical Science.]

Campora, G. A CASE OF HEMICHOREA WITH POST-MORTEM EXAMINATION. [Pathologica, 1922, XIV, 41.]

A hemichoreic syndrome was observed in a woman seventy years of age. The choreic movements began suddenly, were limited to the left side of the body, and lasted for a month, ceasing only one hour before death. At the post-mortem examination of the brain nothing abnormal was found but a relatively recent hemorrhagic cyst occupying, and in part destroying, the right hypothalamic nucleus. By means of transverse vertical sections (Déjerine's method), it was ascertained that the lesion extended ventrodorsally from the anterior end of Luys's nucleus to the capsule of the red nucleus; laterally almost to the posterior segment of the internal capsule; mesially to Forel's area, ending about 3 mm. from the median plane. The *substantia nigra* and the greater part of Forel's area did not appear macroscopically altered. In specimens treated by Marchi's method degenerated fibers were seen in the regions of the lenticular ansa, capsule of red nucleus, and lenticular nucleus, some of them reaching the putamen. The author points out that his observation agrees with the views recently expressed by C. and O. Vogt on the genesis of choreoathetotic movements. [DA FANO, Medical Science.]

Hassin, G. B. HISTOPATHOLOGIC FINDINGS IN A CASE OF SUPERIOR AND INFERIOR POLIOENCEPHALITIS WITH REMARKS ON THE CEREBRO-SPINAL FLUID. [Arch. Neurol. & Psych., 1921, V, 552.]

The patient, a man of twenty-one years of age, showed imbecility, loss of spatial sense, marked paralysis of the 3rd, 4th, 5th, 6th, 7th, 9th, and 12th cranial nerves, with partial involvement of the 10th and 11th nerves on both sides. The spinal fluid was under normal tension, colorless, with five lymphocytes per c.mm. and a negative Nonne test. Two days after his admission to hospital he suddenly died. The diagnosis

was imbecility, polioencephalitis superior and inferior. At the autopsy the brain only could be removed. The pia mater was smooth, easily detachable from the brain, and shiny, except the portion over both occipitoparietal regions, which showed marked hemorrhages. The convolutions were of normal size, and were not flattened: the sulci were of usual depth. The gray matter of the midbrain and medulla appeared unusually dark—almost black—sharply contrasting with the surrounding white substance. Macroscopic hemorrhages or foci of softening were absent; the ventricles were not enlarged and there was no proliferation of the ependyma. On microscopic examination the main pathological changes were found, as expected, in the midbrain and medulla. In these regions a remarkable degree of congestion was observed, the blood-vessels being noticeably distended while the smallest capillaries were unusually prominent and engorged with blood. A new formation of capillaries was also frequently noticed. In the basal ganglia, especially in the lenticular nucleus, the vascular walls sometimes showed proliferation of adventitial and endothelial cells with an abundance of brownish-green, round granules. In some instances, erythrocytes were seen scattered freely in the nervous tissue or enclosed within various gliogenous formations. Similar vascular changes were found in the cortical layers, especially in the occipital lobes, to a lesser extent in the cerebellum, and quite pronounced in the choroid plexus. While no perivascular infiltration could be detected, a characteristic feature was the almost universal presence of great quantities of fat granules within or around the vessel walls, including those of the smallest capillaries. The nerve-cells sometimes appeared quite normal even in those parts of the midbrain which exhibited structural changes in the glia and blood-vessels. Other nerve-cells showed undoubted pathological changes, such as chromatolysis, displacement of the nucleus, sclerosis, atrophy, with a more or less remarkable degree of so-called neuronophagia. Stained with scarlet red, these altered cells showed an abundance of fat drops throughout the entire cell body. The foregoing cellular changes were particularly marked round the third and fourth ventricle and the Sylvian aqueduct, involving the nuclei of all cranial nerves from the 3rd to the 12th pair, including the locus coeruleus. Marked as these changes were, much more striking was the presence of a very great number of "gitter" cells of the varieties α , β , and γ of Jacob (*Histol. u. histopath. Arb. über d. Grosshirnrinde*, 1912, V, 1). They were particularly abundant around capillaries and smaller vessels apparently in those regions which were most affected, as well as in the subarachnoid spaces, where they were mixed with "mesothelial cells" and red blood corpuscles. The neuroglia showed many signs of active proliferation, particularly characterized in the midbrain and medulla oblongata by the presence of many protoplasmic glia cells. Noteworthy changes were also found in the choroid plexus. The vessels were engorged, the endothelial and adventitial cells of the capillaries prominent while the epithelial cells appeared as "unusually large, ex-

panded reticular bodies" and contained a great number of fat droplets. The nerve-fibers were frequently poorly stained, sometimes swollen and irregular in shape, or broken into fragments, stainable by Marchi's method. These findings led the author to the conclusion that polio-encephalitis superior of Wernicke is not an inflammatory, but a partial manifestation of a general degenerative process of the central nervous system, and that it is analogous to other degenerative processes such as amyotrophic lateral sclerosis, subacute combined cord degeneration, etc., from which it differs by the localization of the degenerative phenomena. With reference to the presence of "gitter" cells in the pia-arachnoid and subarachnoidal spaces and to the changes found in the choroid plexus, Hassin puts forward the following suggestion: "The subarachnoid space is a receptacle of the tissue fluids which carry away the waste products of the brain. The function of the choroid plexus is probably to pick up from the cerebrospinal fluid harmful or other products and to render them, as well as the fluid, more absorbable." [DA FANO, Medical Science.]

Fuchs, A. EXPERIMENTAL ENCEPHALITIS. [Wien. med. Wchnschr., 1921, LXXI, 710.]

Some years ago the author showed, at a meeting of the Wiener Verein für Psychiatrie und Neurologie, some cats in which a choreiform syndrome had been caused by means of an injection of a 0.1 per cent solution of guanidine. The peculiar symptomatology began after a period of latency, with frequent sneezing and a slight conjunctivitis, after which the involuntary movements made their appearance. They were accompanied by clonic convulsions which rapidly became more intense and frequent. The final symptoms consisted in paresis of the hind limbs and urinary bladder followed by death. At the autopsy of the poisoned animals pneumonia was found, and in the central nervous system, besides intense congestion, a great number of minute hemorrhages diffusely spread over the white and gray matter of the brain and spinal cord. The author had chosen guanidine for his experiments because this substance appears to form spontaneously in the body under the influence of various infectious agents. Soon afterwards v. Economo published his first observations on lethargic encephalitis and the author restarted his experimental investigations with the object of finding out if, by the use of smaller doses of guanidine, a true encephalitic process could be caused in cats or other laboratory animals. He now reports that this proved to be the case and that, by means of guanidine, meningoencephalitic lesions are obtainable in cats which do not differ from those of lethargic encephalitis. He found, in addition, that a similar pathological condition can be brought about in dogs by first performing an Eck's fistula (anastomosis between vena cava and portal vein) and then feeding the animals with meat. The consequences of such an experiment have long been known to physiologists, but, as far as Fuchs was able to ascertain, no one ap-

pears to have taken the trouble to investigate the central nervous system histologically where an encephalitic process could be observed.

Unluckily, Fuchs does not give any histological description of these various forms of experimental encephalitis, which would have been particularly interesting in connection with the pathology of lethargic encephalitis. He says that the material obtained from his experiments was handed over to Pollack for investigation in Marburg's laboratory, but nothing precise is said as to the results of the investigation, and it is doubtful if they were ever published. The only important reference made by Fuchs in this connection concerns a paper by Rosenthal, who, at about the same time as and independently of Fuchs, also used guanidine for his experimental researches on the ameboid transformation of neuroglia cells (*Histol. u. histopath. Arb. über d. Grosshirnrinde*, 1912, VI, 89). Rosenthal used rabbits for his experiments and as a matter of fact speaks of guanidine-encephalitis, but the description he gives of it and the pictures illustrating his paper do not appear to justify the use of the term encephalitis. Indeed, poisoning with guanidine, when sufficiently protracted, causes various, possibly degenerative, alterations of nerve-cells and an intense reaction, on the part of the neuroglia, but no inflammatory changes such as one may see in cases of lethargic encephalitis or as described in animals experimentally infected with an encephalitic virus. [DA FANO, Medical Science.]

Micheli, F. ON THE AETIOLOGY OF EPIDEMIC ENCEPHALITIS. [Riforma med., 1921, XXXVII, 9.]

Micheli's paper is only a review of recent investigations on the etiology of lethargic encephalitis. It is, however, important because it gives further details as to the microorganism isolated in his Institute by Bastai. This microorganism appears as a very small coccus of roundish or oval shape, and measures from 0.3 to 0.5 μ . Sometimes it occurs in still smaller, not measurable dimensions. Its arrangement may vary; it is Gram-negative; it stains particularly well with Giemsa's fluid. At first it grew only in ascitic fluid and Noguchi's tissue medium, taking from five days to one month to develop. Subcultures were more easily obtained and now the microorganism grows at 37°C. in ordinary media, in which it forms very minute and transparent colonies. It is not hemolytic; it does not produce any green pigment in media containing blood; it is not dissolved by bile; it does not coagulate milk. It ferments glucose, levulose, and inulin. When cultivated in ascitic fluid it passes through the filters Berkefeld N and Chamberland A 3. It is pathogenic for the dog, cat, rabbit, guinea-pig, and rat, particularly when transmitted from animal to animal by intracerebral inoculations. It can be easily recultivated from animals infected with brain emulsions, and, with difficulty, also from those inoculated with filtered cultures. The virus can be kept in 50 per cent glycerol for months.

In the same paper Micheli briefly refers to another similar virus cultivated by Maggiore and Sindoni (*Pediatrics*, 1920, XXVIII, 985) from the blood and cerebrospinal fluid of some cases of lethargic encephalitis. These authors have also been able to isolate, by means of Tarozzi's and Noguchi's culture media, a small anaerobic, Gram-negative coccus, which is stainable by Leishman's fluid. When inoculated into rabbits it gives origin to a meningoencephalitis characterized by perivascular hemorrhages and polyblastic infiltrations particularly noticeable around small veins. According to Micheli the minute coccus of Maggiore and Sindoni does not appear to be essentially different from Bastai's microörganism; however, these authors are not of the same opinion, and think that their coccus has the same cultural characteristics as Flexner and Noguchi's globoid body. They have, therefore, put forward the suggestion that lethargic encephalitis and Heine-Medin disease may be only different manifestations of an essentially identical virus. [DA FANO, Medical Science.]

Santos, R. N. A NEW SYMPTOM OBSERVED IN PARKINSON'S DISEASE. [Arch. de Neurobiologia, Madrid, 1921, II, 3, 292.]

The writer discusses a symptom in Parkinson's disease plainly demonstrated by the kinetograph. It consists in trepidation manifested at times in the forearm and leg during extension when one performed slowly passive movements of flexion and extension alternately in the elbow and knee joints. Santos considers this an added feature of the amyostatic syndrome and believes that it reveals a hypertonus of the sarcoplasm. This would be due to the action of the disease processes in the subthalamic region upon the vegetative apparatus upon which the muscular innervation depends. He considers this symptom of service in differential diagnosis where it may be compared with foot and patellar clonus of pyramidal lesions. Among other things one may compare extrapyramidal rigidity with pyramidal spasticity, or extrapyramidal loss of the "paleokinetic" automatic motility with pyramidal injury of the "neokinetic," that is late acquired movements. [J.]

Marie, P. and Trétianoff, C. THE HISTOLOGICAL CHANGES IN ACUTE CHOREA. [Rev. Neurologique, No. 5, 1920.]

The results of an histological examination of the nervous system of a girl of ten years, who died from chorea after an illness lasting six days. They found widespread inflammatory changes, chiefly affecting the basal ganglia and the cortex cerebri and diminishing in intensity in the direction of the mesencephalon. The process was of an irritative nature, characterized by an intense hyperemia, a pronounced infiltration of the tissues by leucocytic cells and a proliferation of neuroglial elements. Degenerative changes were not distinctly evident. These changes differ from those of acute poliomyelitis (infantile paralysis), as in the latter disease the noble nervous elements specially suffer and the changes chiefly

affect the bulb and spinal cord. For these reasons, also, chorea may be distinguished from encephalomyelitis, induced by hydrophobia, tetanus and Landry's disease. The differentiation from encephalitis secondary to influenza, typhoid fever and certain infectious diseases, though less easy, is possible. The one disease which produces almost identical changes is encephalitis lethargica. In conclusion, they emphasize the point that there is a resemblance in the distribution of the changes with those described in chronic chorea and the chorea of Huntington.

Zachariae. CHOREA GRAVIDARUM. [Hospitalstidende, Oct. 13, 1920, LXIII, No. 41, J. A. M. A.]

This author here reviews four cases of chorea in pregnant women. Under bed rest and sedatives the course is generally mild, especially when there has been chorea before. The mortality according to the records is from 20 to 30 per cent but this is too high as the milder cases are not recorded. Some writers have reported good results from salicylate treatment, especially in the febrile cases. Some advocate interrupting the pregnancy when sleep and nutrition are interfered with, especially when there is complicating heart disease or a psychosis. But all warn that labor aggravates the condition as a rule, so that cesarean section is the only choice. It should not be postponed till the woman is beyond recuperating. Evacuating the uterus by no means guarantees a cure; some have even reported aggravation thereafter. In only one of his four cases was there no history of preceding febrile rheumatism and in this case the woman had had pregnancy nephritis twice, so that a toxemic origin seems plausible.

Lewy, F. H. THE FOUNDATION OF THE COÖRDINATION MECHANISM OF SIMPLE VOLUNTARY MOVEMENTS. [Zschr. f. d. ges. Neur., Vol. LVIII, 310.]

The attempt is made to relate the anatomical physiological observations concerning the brain mechanism for simple coördinated voluntary movements to pathological discoveries in regard to the antagonistic innervation made earlier in cases of spastic states, tabes, paralysis agitans, etc. In the study of the mechanism of coördination the writer brings forward the facts that the vegetative tonus of the striped musculature depends upon the sympathetic nuclei of the hypothalamus, the bodies of Luys, substantia nigra, tuber cinereum, etc. The two phylogenetically old motor systems, the motor system of the striatum on the one hand, the cerebellum, that is the vermis and the dentate nucleus, on the other, exercise some regulating control over these nuclei. The striatum through its connections in the higher animals and man is able chiefly to maintain the locomotor equilibrium. The cerebellar hemispheres which develop first at the more important development of the cortex of the frontal brain belong to the "associated components which maintain the muscular equilibrium." [J.]

Gerstmann, J., and Schilder, P. STUDIES IN MOTOR DISTURBANCES.
II. A PECULIAR TYPE OF MOTOR STIMULUS PHENOMENA. [Zschr.
f. d. ges. Neur., Vol. LVIII, 276.]

The writers discuss a peculiar type of motor disturbance never before observed in focalized disease. In the subsidence of the acute stage of encephalitis epidemica there appeared on the right side certain movements which in outward form reminded them of the hysterical and catatonic stereotypies. This was evident in movements of grasping, scraping, scratching with the hand or in ample rhythmic movements of flexion and extension in the knee and hip joints. The movements were protracted rhythmic uniform spontaneous movements resembling certain complicated voluntary acts. Though this phenomenon lasted for some weeks there were no subjective or objective signs of exhaustion. [J.]

Gerstmann, J., and Schilder, P. STUDIES IN MOTOR DISTURBANCES.
I. PECULIAR FORMS OF EXTRAPYRAMIDAL MOTOR DISTURBANCES.
[Zschr. f. d. ges. Neur., Vol. LVIII, 266.]

The first case reported seems to be in a class by itself though it suggested tumor, encephalitis or multiple sclerosis. In many aspects it seemed to lie somewhere between paralysis agitans and pseudosclerosis though it differed from both. The patient was a woman thirty-one years of age in whom the disease ran a steadily progressive course after the appearance of the symptoms in the first few months. There was a peculiar rigor, poverty of movement, retropulsion, a dying out of the movement upon quick repetition, which was incorrectly called adiadochokinesis. There was tremor resembling that of paralysis agitans, lowering of pupillary reaction, there were bladder disturbances. The character of the hypertonia especially distinguished the case. Repeated passive movements whether brisk or slow, contrary to that which happens in paralysis agitans, increased the rigor to such a point that it could not be overcome. Repeated passive movements increased the tomus while in the pseudosclerosis both active and passive movements, in many cases only active movements, effect this while there is an "associated rigidity" in remote parts of the body. As in pseudosclerosis rather than in paralysis agitans a member which was passively approximated could not be held in position. Another patient with encephalitis epidemica manifested motor paralysis in one arm and extrapyramidal tension with peculiar catalepsy which it was not easy to distinguish from catelepsy of many schizophrenics or from a psychogenic (hysterical) catalepsy. It was here due to subcortical injury. [J.]

Schuster, J. HISTOPATHOLOGY AND BACTERIOLOGY OF CHOREA INFECTIONOSA. [Zschr. f. d. ges. Neur., Vol. LIX, 332.]

Schuster reports the clinical and anatomical conditions of four cases of infectious chorea. Cultures of the staphylococcus pyogenes aureus could be obtained in vitam from the venous blood of three cases. In all

cases the capillaries of the central convolutions, the thalamus, the superior peduncles and of the red nuclei were choked with cocci. There was marked enlargement of the neuroglia cells in the motor tract from the central convolutions to the superior peduncles and to the nuclei dentati of the cerebellum and also in the striatum while the protoplasmic neuroglia was increased. This amounted in places to necrosis of the cells, most severe in the cortex of the central convolutions in the location of the arm and leg centers. In the cord there was marked fiber formation on the part of the hypertrophic neuroglia cells. In two cases there were also macroscopic areas of fresh softening, that is encephalitis, which the author considers as a complication of the septic disease.

Wall, C. CHOREA. [Lancet, Nov. 27, 1920, XXVIII, No. 11, J. A. M. A.]

The results of a study made by the authors at the Hospital for Sick Children, Great Ormond-street, of a severe outbreak of acute rheumatism in children under twelve years of age are set forth in this paper. The total number of cases was 172. In 40 per cent there was an hereditary tendency. Nearly 13 per cent died and over 17 per cent became complete invalids. The most frequent solitary manifestation of rheumatism is chorea. Twelve of these patients died. Sixty-six per cent showed some heart lesion. The twenty-two deaths in this outbreak of rheumatism were with one exception due to carditis. The exception was death from vomiting, acetonemia and collapse, apparently the result of pushing sodium salicylate. The fatal cases of rheumatism most frequently commenced with an acute arthritis, rapidly followed by carditis. Stress is laid on the association of severe stiff neck with serious heart disease. The idea that children's rheumatism is an infection from the bowel the authors state is an hypothesis unsupported by clinical evidence.

Winther, K. MUSCULAR RIGIDITY AND PARALYSIS AGITANS. [Hospitaltidende, Dec. 15, 1920.]

Two cases of disease in the thalamostriatal region are described, causing, in one, general muscular rigidity and, in the other, shaking palsy. Necropsy in both showed bilateral lesions in the thalamus and striatum.

Dresel, K., u. Lewy, F. H. SUGAR REGULATION IN PARALYSIS AGITANS. [Ztschr. f. d. ges. exper. Med., 1922, XXVI, 87, Medical Science.]

By administering 25 gm. of glucose it is shown that cases of paralysis agitans react with a hyperglycemia. Sugar is less quickly assimilated. There is a difficulty in sugar regulation. This is due to a primary disturbance in the vegetative pathways of the striatal and hypothalamic regions. (See Jelliffe, Neuropsychiatric Pilgrimage. This JOURNAL, Sept., 1922. Soc. Proc.)

Dresel, K., u. Lewy, F. H. WIDAL'S TEST FOR HEPATIC FUNCTION IN PARALYSIS AGITANS. [Ztschr. f. d. ges. exper. Med., 1922, XXVI, 87. Medical Science.]

Widal claims that hepatic disturbance can be shown by the fall in the number of leucocytes after a meal consisting of 200 c.cm. of milk administered fasting. The authors found that in paralysis agitans a similar fall takes place. The lymphocytes are especially decreased.

Souques. FUNCTIONS OF CORPUS STRIATUM. [Rev. Neur., Aug., 1920, XXVII, No. 8.]

This topic of predominance in present day neurology is here discussed in connection with a case of Wilson's disease in a man of twenty-seven. The first symptom was a difficulty in writing, and six years later, tremor and muscular rigidity were the predominant symptoms. The function of the corpus striatum is to modify the tonus of the muscles and prevent involuntary movements of the muscles. When this function is lost, involuntary movements and rigidity of muscles take place.

BOOK REVIEWS

Theophrast von Hohenheim gen. Paracelsus. SÄMTLICHE WERKE.
HERAUSGEGEBEN VON KARL SUDHOFF UND WILHELM MATTHIESSEN. I. ABTEILUNG. Sechster Band. [München: Otto Wilhelm Barth.]

The editor who has the sixth volume of this important work in charge explains why it is the first to appear. It belongs at the beginning of the record of Paracelsus' most mature work but it will in time be preceded by the volumes devoted to his earlier life and work, which will thus be perpetuated also in this edition. This volume gives promise in form and content of a work of more than usual value for the medical or the literary library. Attention is paid not merely to the faithful reproduction of the actual writings of this learned and versatile man but there is also a brief review of the history of the writings and their early publication with facsimile reproductions of title pages. The illustrations of medical practice of these early days as well as of portions of manuscript from Paracelsus' hand give some idea of the value of this work from the medical and general cultural points of view. The content of this volume as the writings of Paracelsus concerning wounds and open injuries as well as his extensive contribution to the history and treatment of syphilis indicate the value to be found for medical history. Of the directness, the clearness of the great physician's own style and of the rich flowing quality which he gives to the matter presented, only a brief reminder is enough. This first volume to appear is fitted to stimulate anticipation of the full edition to come. [J.]

Pound, Roscoe. THE SPIRIT OF THE COMMON LAW. [Boston: Marshall Jones Company.]

The dignified yet flexible literary style of this book is one too rarely encountered among the many books devoted to special fields of interest. The author is capable of viewing the facts in his field with the judicial breadth of a true culture. He welcomes the gradual changes which he observes entering into the conception of common law. Matter and style therefore make for the reader a valuable book setting forth the traditions of common law as they have developed through Anglo-American theory and practice, based upon the Germanic traditions behind them. They have faced the influence of Roman law but have received only a partial modification through this. The common law has maintained its character as based upon the idea of relation and of the legal consequences which result from this. Yet this fundamental character has been subject to change in conception and application of its principles.

It is of psychological interest to trace throughout this presentation of the history of our common law the pertinacity with which the human mind, represented in the interpreters of law, clings to the concepts which are based upon some imagined final authority, some arbitrary final right, in this case a natural law which is to be found, not made. One sought to find it through philosophy, another through history, another through any other system in which deduction could be made to work. Hand in hand with this conception went the emphasis upon the individualistic function of law, the assertion and protection of the rights of an abstract individual. Pound writes the history of this long period when theory and practice thus based hindered the progress of law but he finds also that common law is slowly coming to a more flexible means for securing a larger socialized good in which the individual's rights are discovered in a more natural way. Law for Pound is the result of the working of many causes. He is not afraid to recognize it as "something created by society, through which the individual found a means of securing his interests" but securing them in relation to the society in which he lives. Law therefore has to do with concrete situations and not with a vague abstraction which no one can define. [J.]

Levine, Israel. *THE UNCONSCIOUS. AN INTRODUCTION TO FREUDIAN PSYCHOLOGY.* [New York: The Macmillan Company, 1923.]

Many books upon psychoanalysis appear which obtain an impetus from psychoanalysis itself only to depart upon a speculative excursion or an equally irrelevant criticism of the author's own. Levine's book falsifies its title in neither of these ways. Neither is it a slavish repetition of what has been said by higher authority but it represents a distinct contribution to psychoanalytic literature on the part of the author. This lies in part in the exceedingly clear manner and well arranged form in which the book is given to the public. It lies also in the thoroughness with which Levine has made himself acquainted with Freud's writings and truly assimilated their essence. Simply stated, he knows of what he is writing when he speaks of psychoanalysis and discusses its tenets. Further his point of view is that of one whose business is the studying and teaching of philosophy. He is able to look upon his subject therefore with a special objectivity while he submits it to the test of the theory of knowledge. He approaches the examination of Freud's hypotheses by way of a brief survey of the recognition and inquiry into the unconscious into which philosophers before Freud's day had entered. He shows how short a way they had gone in knowledge of the unconscious and from what different points of view they had considered it. All these points of view drew thought onward in the direction of a deeper knowledge but it remained for Freud actually to enter into the field and make of the theory of the unconscious a scientific penetration into facts. Levine has followed closely the writings of Freud in expounding what Freud's discoveries have been in the gradual unfolding of more knowledge of the unconscious. Everywhere Freud's

actual statements are brought forward for careful examination. Then Levine has discussed briefly the significance of the unconscious from Freud's point of view in education, ethics, art, or in any other field of human mental activity. As one follows Levine's clear presentation of the facts of psychoanalysis as he has found them and looks with him into their wide implications, one can only feel that psychoanalysis has well stood the theoretical test to which this writer has submitted it. It is reassuring, if reassurance is needed, to find how the objections most urged against psychoanalysis lose their substance in such a real exposition of its facts.

We have but one criticism and that is the uselessness of including the humoral doctrines of endocrinology as being any more valid in "making" personality than the earlier humoral temperament notions that give us "gall and wormwood" natures from the liver, etc., etc.

Bertrand, Ivan. LES PROCESSUS DE DÉSINTÉGRATION NERVEUSE. [Masson et Cie, Paris.]

In his usual graceful style Pierre Marie contributes a preface to this monograph coming from the pathological laboratory of the Salpêtrière Clinic. Secondary degenerations in nervous structures have always interested neurologists, but it cannot be said that one has penetrated very deeply into the intimate secrets of the processes underlying the usually described phenomena. This the author has attempted by utilizing the finer microchemical technics of modern neuropathology, some of which are original with himself, while others we owe to Cajal, Hortega, Alzheimer, Spielmeyer, Jacob and others.

He has followed out a plan in that in his first part the disintegrating processes are studied in themselves, in the second part they are related to nosological situations of practical importance to everyday neurology. Believing that histogenetic and histochemical differentiations are as yet impossible Bertrand first deals with the products of degeneration on a morphological basis.

For the elucidation of the *granulations* and *other kinds of bodies* described he details the technics evolved and illustrates freely. Cellular changes then follow, then channels of elimination of the "abbau" products. In the second part, changes are described as they occur in cerebral traumata, senile and arteriosclerotic foci, hemorrhage, softening, epidemic encephalitis, abscess, paresis, cerebral tuberculosis and brain tumors. Spinal cord degenerations are also dealt with very briefly, as also the spinal ganglia and peripheral nerves.

The monograph is beautifully illustrated, well printed and is a valuable contribution to the modern histopathology of the nervous system.

Conroy, Ellen. THE SYMBOLISM OF COLOUR. [Wm. Ridder & Son, Limited, London.]

A very popular, fragmentary and absolutely uncritical approach to a large and interesting group of esthetic and psychological considerations.

Thorndike, Lynn. A HISTORY OF MAGIC AND EXPERIMENTAL SCIENCE DURING THE FIRST THIRTEEN CENTURIES OF OUR ERA. Vols. I and II. [New York: The Macmillan Company, 1923.]

Thorndike has made very diligent research into a period about which he is able to correct many accepted errors. He shows by his examination into the works of the men of these early thirteen centuries that human thought did not cease its efforts in this period about which we to-day know too little. It was not in truth a length of time sterile in the endeavor to maintain and add to already existing products of thought. Its products of thought cannot be called facts to any great extent. For the mode of reaching out after truth was largely in error and these same errors of thought were carried forward from generation to generation and from nation to nation. Thorndike examines too the older material which was the heritage of these centuries and which the latter carried forward. This forms the background for his more detailed study of many representative men of the latter period. It makes more clear the position of their work in the great stream, full but slow-moving, in which human thought has made its advances. He shows how the belief in magic and the attitude of mind that interprets through magic kept human thought for many centuries in their impeding grasp. Men re-interpreted the magic conceptions, some more courageous or progressive thinkers fulminated against their bonds or against some particular application of the belief in magic but they were not yet able, the clearest thinkers among them, to depart from its power. They strove often for an empirical knowledge but it was not that of an empirical investigation of nature such as marks modern science. Some observation of natural facts had place but this was largely invalidated by the ready credulity for much that had no support through observation. And the empiricism was largely a test of supposed facts obtained through magic belief applied to particular instances. Yet there was a steady groping toward light, toward the clearer experimental science of to-day. Thorndike sets all these representative men, of whom he has made a generous collection, more fairly in their relation to one another than is usual. This has modified the extravagant overappreciation of the part that some have played while it has given due credit to others whose work was essential also in building up the whole fabric of intellectual advance.

The author's study of magic is that of a cross section of its history as it enters into this particular period and continues still at its close as the background of thought. It is that rather than a deeply penetrative study of magic in itself. An appreciation of the latter is not lacking but is found chiefly in the final chapter of the two volumes. Here the author has given rein to a dynamic feeling for his subject not quite apparent enough in what has preceded. These concluding words however, reflect back upon all this more encyclopedic material. They give it life as the record of the struggle of human thought to work itself free from the ancient fetters, fetters which the author clearly shows bind us still to-day.

Klages, Ludwig. HANDSCHRIFT UND CHARACTER, GEMEINVERSTÄNDLICHER ABRISSE DER GRAPHOLOGISCHEN TECHNIK, Fünfte bis siebente Auflage, Mit 137 Figuren und 21 Tabellen. [Johann Ambrosius Barth, Leipzig.]

Klages, Ludwig. VOM WESEN DES BEWUSSTSEINS. [Leipzig: Johann Ambrosius Baarth.]

The writings of Klages have the charm which comes from a facile literary expression enriched by the author's broad cultural background. These he puts to the service of keen penetrating thought inspired by a profound philosophical point of view. With him one field of thought and of knowledge lies close to every other.

One finds therefore much to challenge thought even if one cannot follow in agreement all along the way in the author's search into the nature of consciousness. He frankly acknowledges his metaphysical leaning. He pursues his quest after the nature of consciousness first by clearing his way of certain variously accepted points of view. He will have none of a "vis vitalis" as a solution of the problem of life nor yet of a "vis formativa." He rejects the doctrine of the mutual interworking of consciousness and the body, that of their psychoparallelism, and so on through various psychological and philosophical theories set forth in the study of consciousness. He himself discusses the various processes by which consciousness comes to be known. He arrives at the doctrine that the connection of the soul with the body is that of "the sense with the appearance of the sense." All that appears has a soul, which is known in the image of the thing. From this point of view everything lives, not alone those organisms which we call animate. The ego is a personally acting individual, the historical bearer of the consciousness. The latter has its origin in a fundamental spirit. The body plays the rôle of receiving impressions from the outside world or of offering response to it. The author's metaphysical desires seem to strain at the leash of causal facts. He admits as much. It is necessary through an era of science for investigation to remain in the realm of causal facts. The ultimate desire, however, is to penetrate into a realm of thought beyond this where the nature of life may be sought differently, a region of investigation which in purpose and method will transcend this lower temporary realm.

The larger work, of which this study, Klages states, is but a forerunner, for the time has given place to the reappearance of his work upon character and handwriting. To this too the author brings the richness of his cultural equipment. He reveals also his penetrating psychology, an insight that is not content with superficially obvious facts which play their part in expression through handwriting. His material for study is that gathered by the psychologist and psychiatrist, one whose interest extends itself beyond strictly clinical boundaries. This gives to his discussions as well as to the illustrative material which he has assembled a peculiar value both clinically and culturally. Klages' material and his manner of presentation, however, both awaken an interest he fails fully to satisfy. One feels that an author with his equipment and with his

warm interest in the nature of the manifestations of the human psyche could have led us deeper into interpretations. There is more to be discovered along the way which he has pursued in the study of these specimens of handwriting. Still more rigorous research into the actual causal facts of human lives would bring more light upon these manifestations themselves and further knowledge of the inner life as this light would be reflected back upon hidden causes. The nature of life, which the author has told us is the ultimate goal of all investigation, perhaps lies closer to investigation in this field of actual causal facts than this psychology has yet discovered.

Mateer, Florence. *THE UNSTABLE CHILD. AN INTERPRETATION OF PSYCHOPATHY AS A SOURCE OF UNBALANCED BEHAVIOR IN ABNORMAL AND TROUBLESOME CHILDREN.* [New York, London: D. Appleton and Company, 1924.]

This is a book which furnishes very practical guidance in the work with children. It contributes much to the understanding of their need of psychological aid. Its value will be felt not by the special worker alone. It should do much to inform an inquiring public in regard to the aims and the possibilities in the large field of clinical psychology. It is fitted to remove much of the prejudiced misunderstanding which even yet exists in regard to such work. It will on the other hand correct that to which the writer refers as the undue optimism of the inexperienced. She refers in this remark to the use of formal psychological tests. Throughout her entire book there is recognition of their value but she shows that this value exists only in relation to a much broader and more complex psychological investigation of which they form one part. Her survey of the whole subject, of the work to be done, the methods by which it is done and what is to be expected of such work is a broad one, all inclusive of the many complexities that present themselves on every hand. She points out the need for systematic orderliness but only as this stands at the service of an attitude of ready adaptation to any variety of individual need. It is necessary, she shows, to be alive to the variety of situations which will constantly present themselves and patient with the individual problems that arise. These may necessitate deviation from accepted method, they certainly demand deliberate consideration. In other words, she presents the work as that dealing with human problems to be humanly considered.

No book has so well presented the correlated work of the various methods as they form many sided yet unified agency for meeting the clinical work. The author's discussions of the children who need help, the subject material for such agencies, is equally comprehensive in its sympathy. She not only understands the individual factors which set the child aside as psychopathic in his manifestations but she knows how to estimate these factors and the entire psychopathic situation in its true relation to the normal life. She points out therefore the meaning of the adverse manifestations and the psychotherapeutic possibilities. The work as she presents it has therefore definite aims striven for by definite, effective means.

they also reveal the difficulties, acknowledged as sometimes in-
The practical illustrations which she has introduced reveal this as
surmountable, in the way of attaining the most desired goals. It is
a most encouraging sign of the times that so much of analytic
understanding of emotional human factors has its accepted place in
practical psychology as represented here.

Bleuler, Eugen. TEXTBOOK OF PSYCHIATRY. Authorized English
Edition by A. A. Brill. [New York: The Macmillan Company.]

Bleuler as a writer upon psychiatric problems scarcely needs an
introduction to the readers of the JOURNAL. Rather we are to con-
gratulate ourselves that his textbook upon this subject, comprehensive
in its survey of the field, penetrating in its interpretation, and practical
in its attack upon these problems of psychiatry has been made
available to students in our own tongue. Brill has again rendered
important service in bringing the work of an European authority
before our medical public.

Bleuler is a profound psychologist before he is a psychiatrist.
He has applied to the latter office all the equipment which a thorough
training could bring to a personality naturally thorough in its inves-
tigations, forceful in its progressive interest. He brings all the re-
sources of science to the understanding and the better control of the
workings of the human mind. He has a wide control of the litera-
ture. This is evident in his free use of all that others have contributed
to the knowledge of psychiatric problems without a slavish following
of any one point of view. He borrows largely from Kraepelin in
the descriptive statements of the various forms of mental disease
in which the problems of psychiatry present themselves. Yet he
looks further than Kraepelin as he enters more practically into the
dynamic factors which cause mental disease. In these an understand-
ing of mental disease is to be found and through them redirection
and control are to be brought about. Yet one feels some disappoint-
ment even here. There are places where one expects more of the
psychodynamic attitude of approach, where one fails to find guidance
as to the value of the various forms of psychotherapy which might
be applied to the situation. The descriptive matter of the book,
informed as it is with the author's spirit of forceful pressing into
problems to act upon them, leads toward the actual psychotherapeutic
possibilities. Yet more might have been revealed or even implied of
the actual relation of these psychotherapeutic possibilities to the vari-
ous situations presented. This would have led also to deeper in-
terpretation, for interpretation and redirection of the dynamic
psychic factors go hand in hand. Nevertheless the work is one which
presents a wealth of information which leads onward in the direction
of the modern research and treatment.

Pulay, E. METABOLISM UND HAUT. [Berlin and Vienna: Urban
and Schwarzenberg.]

The author's point of view in this book, his consideration of the
skin in its structural and functional relations to the entire organism,

especially in its relation to the chemistry of the blood, gives it an interest in more than one field. He devotes a portion of his work to a more general discussion of biochemical and biophysical problems in the light of the increasing knowledge of the present day. This portion contains much matter relating to chemistry of the blood while a special chapter treats of the methods of investigation in this field. Dermatitis eczematosa and urticaria are important subjects in the clinical part of the work. Pulay holds to the conception of exudation processes as the basis of the morphological symptoms. Hyperuricemia and still more hypercholesterinemia and glycemia are present in dermatitis eczematosa. Itching and tension result from altered exudation conditions in the sensory nerve endings. He accepts the Vater corpuscles as organs for the erectile sense and these are excited through the abnormal pressure of the exudate. In urticaria there is increase of the uric acid in the blood, usually increase of blood calcium and always more or less hypercholesterinemia. Among the symptoms of urticaria he considers the wheal indicative of the tissue reaction, itching the expression of the sensory nerve reaction and dermographia of the vasomotor-trophic reaction. He points out the significance of the studies of Quinke in case of edema, of scleroderma and of Raynaud's disease though no conclusion can be drawn from these as yet. The author is of the opinion that the altered chemistry may come to be explained chiefly through the vegetative nervous system working upon and through the endocrine organs. Psychogenic factors are not appraised in terms of modern dynamics.

Schroeder, Paul. INTRODUCTION TO THE HISTOLOGY AND HISTOPATHOLOGY OF THE NERVOUS SYSTEM. Translated by BALDWIN LUCKE and MORTON McCUTCHEON. [J. B. Lippincott Company, Philadelphia and London.]

This is an extremely clear and concise presentation of the chief features involved in the histology and histopathology of the nervous system. It is elementary and therefore valuable. It is readable and contains the essential rudiments in this large field of research. It is an excellent book and can be used to advantage by all beginners in the study of the histopathology of the nervous system.

Plaut, F. and Spielmeyer, W. NISSL'S BEITRÄGE. Vol. II, Heft. 1. [Julius Springer, Berlin.]

This interesting series of monographic studies on the relationships between clinical expression and course and anatomical findings in neuropsychiatric disorders has been reestablished under the old name, but edited by Plaut and Spielmeyer. The first case reported is one which clinically seemed like a dementing parietic in a luetic proved on complete histological examination a subacute type of multiple sclerosis.

The second was a complicated clinical story of an hereditarily involved individual of probable manic-depressive ancestry who had a thyroid enlargement with advancing hyperthyroid signs. Following thyroidectomy tetany symptoms, epileptiform attacks and a fatal

confusional psychosis with manic-catatonic signs finally resulted after a few months. Anatomically there was shown a complete loss of the thyroid, loss of the parathyroids, partly removed at operation, and the rest destroyed by inflammatory infectious extension. The thymus showed a definite infantile state and the adrenal cortex was fatty. Other endocrinopathies were absent. The central nervous system showed a progressive parenchymatous degeneration with increased glia formation, involving both the central nerve cells and the fiber tracts and peripheral nerves.

A third case was a thirteen-year-old psychopathic boy who lied, stole and was unruly. He suddenly developed status epilepticus and died. The anatomical study revealed a hard tumor-like gray white focus in the left frontal pole without other discoverable pathological findings. The histological genesis seemed to be a focalized sclerotic encephalitis in the left frontal fiber systems with diffuse ganglion cell changes of the cortex. It resembled cases described by Schilder, Jacob and others.

A fourth case is also presented in this extremely valuable study.

JELLIFFE

Hildebrandt, K. I. NORM UND ENTARTUNG DES MENSCHEN. Second Edition. [Silbyllenverlag, Dresden, 1923.]

A second edition of this book has appeared after only two years. It is a book profoundly serious in its thought and its purpose. The author not only writes with the interests of a high and practical idealism but his discussion is based upon a wide knowledge and a careful consideration of the facts of biology, including a careful testing of the facts of heredity, of phenomenal psychology and the life of the state. He enters into the discussion concerning vitalism and mechanism, and discusses the purposeful organization of humanity and of the state from the standpoint of natural history. Only a brief foreword distinguishes this edition from the former one but in this the author emphasizes the place of his book among the works of art of the present day. He calls attention to its employment of the facts of natural research and of the conclusions drawn from these. These make it possible to distinguish the mere "advances" of mechanistic methods from the simple and more convincing facts of life itself. The latter intellect may test as its means and instruments by which to know life. This attitude as well as the content of the book itself reveals the breadth and depth of the author's culture and of his nature.

Bailey, Percival. DIE FUNKTION DER HYPHYPHYSIS CEREBRI. Separatdruck aus Ergebnisse der Physiologie, XX. [Band: J. F. Bergmann, München und Wiesbaden.]

Attention is here called to this most excellent critical digest and review of the functions of the hypophysis. Bailey takes up the chief contributions and presents a rounded picture of the present day knowledge concerning the hypophyseal functions. The pars anterior, he states, in his general conclusions, is an endocrine organ. Its

product or products have not yet been chemically isolated. Their individual physiological activities have not yet been definitely differentiated. The pars posterior is structurally not a glandular organ. When removed from the organism it causes no (appreciable?) symptoms. A substance can be extracted from it, nevertheless, which has very definite effects upon injected animals. The chemical structure is still unknown and it is not yet settled that this is a secretion product, or that it has a definite functional activity.

Freud, Sigm. EINE KINDERHEITSERRINERUNG DES LEONARDO DA VINCI. Dritte, vermehrte Auflage. [Franz Deuticke, Vienna und Leipzig.]

In many quarters, it would seem, if the reviewer's understanding is not at fault, there exists a radical misconception concerning this extremely fascinating monograph. Such misconception has not interfered in the main with its appreciation in more enlightened channels, else its third edition would not have been called for, but since the reviewer is of the opinion that we have here a most unusual contribution to the understanding of that which has been appreciated by the test of time as genius, renewed attention is called to this third edition of Freud's study of the unconscious motivations which played a definite rôle in the development of Leonardo da Vinci's transcendent evolution.

There have been and are still those who would *prefer* to see in the revelations of the unconscious of mankind only the base and the bestial, man's evolutionary heritage from lower to higher forms, typified as "*force*". "*Beyond Good and Evil*" as Nietzsche has phrased it, can be read by such only in its regressive aspects. These find nothing of value in this study. Fortunately Freud has shown the wonderful capacities of the unconscious for creative and valuable capacities, in spite of those aspects which a narrow theological dogmatism would stigmatize as of the Devil. As for previous editions the reviewer's comment is: this book is of great value and is entitled to a high place in the estimation of those who would attempt to envisage "*Emergent Evolution*" in its most hopeful aspects.

Misch, Julius. LEHRBUCH DER GRENZGEBIET DER MEDIZIN UND ZAHNHEILKUNDE. Two vols. Third Edition. [F. C. W. Vogel, Leipzig.]

It is an astounding fact that three editions of a work of this kind should have been demanded since the beginning of the war. In the first place each volume is 700 pages in extent. They consist of a series of monographic detailed expositions of every conceivable anomaly or difficulty that can be found in and about the oral cavity.

It is a fortunate sign that present day medicine is not altogether content to let a *laissez faire* policy too strongly prevail; at the same time one cannot but be mindful of the opposite signs of overspecialization and of the making of mountains out of molehills. This latter evil seems to have been carefully avoided in this really excellent treatise.

For the neurologist there are many interesting aperçus. Thus in the discussion on *Tubes*, apparently not a pertinent section, one finds a large number of tooth and jaw implications carefully described and the physio-pathology accurately elaborated. The lips, the gums, the teeth, the jaw, the pharynx, antra and related structures are affected in definite ways in a host of nervous and mental disorders. These have been very adequately dealt with by Drs. Kron, Kronfeld and Misch.

On the whole this is a most meritorious contribution of value alike to physician and dentist and to all those working in and about the head region.

Oppenheim, H. LEHRBUCH DER NERVENKRANKHEITEN. Zweite Band. Siebente wesentlich vermehrte und verbesserte Auflage. Bearbeitet von R. Cassirer, K. Goldstein, M. Nonne, B. Pfeiffer. [Verlag von S. Karger, Berlin, 1923.]

The second volume of the new Oppenheim has just appeared. As already indicated the work has been entirely revised, brought to date, and in many ways definitely improved. It may really be said to stand as a monument of structural neurology.

Goldstein, whose preëminence in the anatomical and topographical fields is recognized, has written the chapter on Diseases of the Brain so far as Anatomy, Physiology, Localization Problems and General Symptomatology are concerned. This section is most excellent. Pfeiffer has written the chapter on Meningitides, the Apoplexias and the Encephalitides. Goldstein, the disorders of the Medulla, Pons, and Cerebellum. Nonne has dealt with Hysteria, Neurasthenia, and related neurotic states in a very broad and catholic manner. Here Oppenheim's older and narrower dogmatisms have been broken into and a more rounded picture given of this difficult group of disturbances. This chapter, however, is still far from getting at grips with the actual situation. Nonne's conception of a typical Zwangsneurose is painfully inadequate. It bears almost as much relation to the reality as a boy's velocipede does to a Rolls-Royce, in which position Nonne is not an exception. Goldstein's treatment of the striatum diseases is ample and in line with the active investigations going on in this field. Cassirer has done the chapter on the Vegetative Disorders.

The volume of the book has expanded to 2,300 pages. These are packed full of well digested material maintaining the older standard of this book as the most complete of its kind. In one respect one could wish that a greater philosophical unity might have been attained. It may be that such a wish is an illusion in the present state of our ignorance of the nervous system, but at all events some effort might have been made to tie up the organism into some sort of a system. The work is undoubtedly the most exhaustive single treatise of the various parts of the neurological picture puzzle. Each bit has been most extensively investigated, but the relations between the pieces has been too much neglected. In one other respect as well one might be inclined to feel at some variance with the trends of the

book. The structural significance of things is adequately presented, the human organism as a closed system is as far as the concept of disease has been here formulated; that which infuses meaning into the machine—how it mishandles the forces of the environment—this is an almost nonexistent conception in this otherwise masterly treatise.

Nageotte, Jean. L'ORGANISATION DE LA MATIÈRE DANS SES RAPPORTS *avec la Vie*. [Felig Alcon, Paris.]

This is an extremely interesting and valuable work. Chiefly founded on a minute and careful series of experimental histological researches mainly localized about peripheral nerves, the author has come to a number of philosophical conceptions concerning the organization of the tissues, the constituent parts of the cell and the general problem of life.

The peripheral nerve is already an "organ" of this life and therefore contains an exact record, paralleled by other organs of an evolutionary biology, which tending more and more to be stateable in terms of physics and chemistry becomes more readily comprehended and workable. Not that such a conception still lacks something but following it as a discipline leads towards sounder conceptions and away from lazy mystical satisfactions.

An extended review is desirable but space forbids. We commend it heartily, especially to all workers in processes of regeneration of peripheral nerves upon which changes the author has based his more general biological conceptions. It is a very scholarly production.

OBITUARY

G. STANLEY HALL

G. Stanley Hall died at his home May 1 after a prolonged illness. Dr. Hall, one of the leading figures in the teaching of psychology in this country, was the founder of the *American Journal of Psychology*, and was president of Clark University from its foundation, in 1888, until his retirement in 1920.

He was the author of numerous volumes on philosophical and psychological subjects, and a Fellow of the American Academy of Arts and Sciences.

A descendant of Elder William Brewster and John Alden, of the Pilgrim colony at Plymouth, he was born at Ashfield, Mass., February 1, 1846. He was graduated from Williams College in 1867, studied a year at the Union Theological Seminary in New York, and on the advice of Henry Ward Beecher, who obtained for him a loan from Henry W. Sage, New York merchant, went to Germany for extensive study of philosophy and psychology.

He served for several months as a war correspondent for American papers during the Franco-Prussian War. Returning to America, he took the degree of Doctor of Philosophy at Harvard in 1878, meanwhile having taught at Antioch College for four years, and served as instructor in English at Harvard for a year.

Before going to Worcester he was professor of psychology at Johns Hopkins University for seven years. Dr. Hall was without doubt one of the most wide awake and stimulating teachers in this country.

SAMUEL B. LYON

Dr. Samuel B. Lyon died last month at the age of eighty-two. Dr. Lyon was superintendent of the Bloomingdale Hospital at White Plains for more than twenty years, during which he supervised the erection of the new hospital. He retired in July, 1911, with the title of Superintendent Emeritus, after twenty-five years' service for the institution. He was a member of a very old American family, trac-

ing his ancestry on both sides to Colonial times. One of his ancestors was Edward Winslow of the Mayflower.

He was born at Palmer, Mass., and started his career in business and banking. After an interruption due to a threatened lung ailment he entered the Government Hospital for the Insane at Washington, D. C., and thereafter devoted himself to medicine and hospital management. He graduated from the University of Medicine at Washington, studying afterward in Vienna. Dr. Lyon was a member of the New York and American Neurological Societies and an active worker in the American Psychiatric Society.

N. B.—All business communications should be made to **Journal of Nervous and Mental Disease**, 64 West 56th St., New York.

All editorial communications should be made to **Dr. Smith Ely Jelliffe**, Managing Editor, 64 West 56th St., New York.

The Journal OF Nervous and Mental Disease

An American Journal of Neuropsychiatry, Founded in 1874

ORIGINAL ARTICLES

A CASE OF ACUTE PULMONARY EDEMA AND TERMINAL PNEUMONIA FOLLOWING THE DESTRUCTION OF THE PULMONARY SEGMENT REFLEXES AT THE LEVEL OF THE SEVENTH DORSAL SEGMENT *

BY TEMPLE FAY, M.D.

PHILADELPHIA

The recent work by Bullowa¹ upon pulmonary segment reflexes may explain an unusual and abrupt appearance of pulmonary edema in a case in which an operation for intercostal neuralgia led to the tying off of the sixth, seventh, and eighth posterior roots of the dorsal cord on the left side.

Areas of hyperalgesia, which the author terms pulmonary segment reflexes, have been found in certain acute pulmonary conditions. In pulmonary diseases two distinct groups of segments are involved: the cephalic group, which extends from the third cervical to the second thoracic, thus including the upper extremity, and the caudal group, which consists of and usually involves the seventh thoracic and adjacent segments. Bullowa has found an increased muscle tone over these segments, due to irritative processes within the pulmonary cavity. The cutaneous reactions have been of variable intensity, but usually are present to some degree.

The author shows the origin of this reflex distribution to be directly traceable to the embryonic anlage of the lung. The cephalic representation, of course, appears in the development of the lung bud, which becomes the visceral portion of the lung. In the fourth

* From the Neuro Surgical Clinic of Dr. Charles H. Frazier, University Hospital, Philadelphia.

¹ Bullowa, Jessie G. M. Amer. J. M. Sc., 166:565, October, 1923.

or fifth week of embryonic life the lung bud appears as an outgrowth on the anterior surface of the gut, at the level of the third cervical segment, which corresponds with the sixth somite. She points out that it has been shown recently that the vascular system has just as definite a phyletic plan as has the development of the nervous system, which is contrary to the old view that blood vessels followed organs as the need for them arose.

The caudal pulmonary, or seventh dorsal, segment is distributed to the vascular loops formed from the primitive post-brachial plexus into which the pulmonary bud advances. It is, therefore, this vascular loop, formed from these primitive arches (a relic of some primitive vertebral type in which the entire gut participated in respiratory exchange), which forms the network of vessels about the alveolar spaces, and since its somatic derivation is around the seventh dorsal segment, the *caudal reflex group* becomes entirely a *vascular reflex*.

The cephalic group of reflexes makes its appearance simultaneously with lesions of the lung, as in bronchitis, pneumonia, either lobar or lobular, tuberculosis, and laryngeal or bronchial diphtheria.

The vascular, or caudal, reflex may appear or disappear independently under certain conditions, as in asthma. Depending on whether the visceral or the vascular reflex predominate, we obtain a cephalic or caudal type in emphysema.

Clinical conditions causing distensile pressure in the pulmonary vascular bed give rise to increase in muscle tonus corresponding to the seventh thoracic segment with some hyperalgesia over this area.

In passive congestion of the lungs there is always present seventh thoracic hyperalgesia, which disappears when the congestion is relieved by either reduction of blood mass, or fluid intake, Karell diet, or as the result of improvement of the peripheral pulmonary circulation, from rest and stimulation. There is also a diminution of the muscle spasm of the segments involved.

The following case is presented because of its clinical and pathological bearing upon destruction of the posterior root fibers of the seventh dorsal segment:

REPORT OF CASE

M. L. W. (No. 316 N. S.). The patient was admitted to the service of Dr. Frazier, 10/21/22, complaining of severe pain in the left side. The patient stated he had suffered from pain in the left side for over twenty-five years; dull, aching in character, coming on at intervals and lasting for an hour or more. No movements of the body or of the chest by deep breathing seemed to aggravate the

pain; at the present the pain is radiating in type and referred to the costal distribution of the seventh dorsal segment of the cord. At the present time the pain comes on in marked paroxysms in which the patient doubles up, places his hand over the left side, and his respirations become rapid and labored. He states that tablets of Atophan, which he is taking, have relieved the pain so that, at the present time, it is not constant in character.

He denies all previous illness; is a storekeeper by occupation; married and six children.

Physical examination shows the patient an obese, middle-aged Jew, who walks the floor partially bent over and grunts frequently with pain. He appears to be suffering intensely. He frequently gets out of the chair and walks about with his hand over the area of pain and also over the heart.

The blood pressure is 130-85.

The head is grossly normal, inclined slightly to the right.

The eyes show a slight icteroid tint; the pupils slightly irregular; the right is larger than the left; the response to light is prompt but not full; consensual reflexes active. No disturbance of the cranial nerves. Teeth, tongue, and neck negative.

The chest is scaphoid in type. He stands up with a slight tendency to bend forward; expansion limited on the left side. Accessory muscles of respiration active. There is slightly impaired resonance to percussion throughout, probably due to excessive, subcutaneous fatty deposits. Overabundance of hair on the chest. Breath sounds diminished over the left base posteriorly. No râles detected. Heart sounds of fair character and distinct; no murmurs noted; rate normal and pulse regular.

Abdomen is fat and flabby. No masses are palpable. Extremities are negative. Station and gait normal. Patellar reflexes slightly diminished. Reflexes of the upper extremities normal. No sensory disturbance. There is no hyperalgesia over the area of pain. No tenderness to percussion over the vertebrae.

Pain is entirely subjective and referred from a line drawn between a point just opposite the angle of the scapula down to the sternum just below the nipple of the left side (Figs. 1-3). There is some scoliosis to the left. He favors this side on account of the pain, though deep breathing or movement does not seem to accentuate it.

Blood examination was normal. White count 7,600. Urine showed trace of albumen; specific gravity 1.023. No sugar, acetone, or diactic acid.

Kidney function test: First hour, 15 per cent; second hour, 25 per cent; total, 40 per cent.

X-ray examination: Thoracic spine marked hypertrophic changes from the mid-thoracic region downward with bridging across the intervertebral spaces. The bodies are rather close together, suggesting some atrophic changes in nature of vertebral discs (Pancoast).

10/31/22. Attempt was made to inject the seventh thoracic nerve on the left side with alcohol. This was not successful.

11/1/22. Blood pressure 130-85.

11/6/22. Marker placed for operation. X-ray identification.

X-ray report: Marker is on level with the intervertebral spaces between the sixth and seventh thoracic vertebrae, or on a level with the spinous processes of the sixth thoracic vertebrae.

11/7/22. Patient was operated on to-day by Dr. Frazier; laminectomy and rhizotomy performed.

Operative Note (Dr. Frazier): "Laminectomy—removal of the spinous processes of the third, fourth, fifth, and sixth thoracic vertebrae. Nitrous oxide anesthesia. Patient took anesthesia very badly: was cyanosed and bleeding was so profuse that the nitrous oxide anesthesia had to be discontinued and local anesthesia employed. The dural sac was opened and three posterior roots were tied. In the X-ray plates this was opposite the disc between the sixth and seventh thoracic vertebrae. According to our charts, the roots tied should have been the fifth, sixth, and seventh thoracic. The patient naturally complained of a great deal of pain at the time the roots were tied, and the blood pressure at this point dropped to 80.

"Coincidentally the patient was asked whether the pain, at the time the roots were being tied, was the same as that complained of before the operation, and he said that it was. The wound was closed with tier sutures without drainage."

The patient's cyanosis and apparent respiratory difficulty was so great on leaving the operating clinic that he was returned at once to his room without a moment's loss of time.

11/8/22. Twenty-four hours after operation patient shows marked dyspnea, high temperature, many râles in the chest, with a loose cough which does not yield to large doses of atropine.

Patient has not voided to-day.

White blood cell count showed 34,900 leucocytes.

Patient catheterized and twenty-eight ounces of urine removed.

Diagnosis: Lobar pneumonia at the left base.

11/9/22 (noon). Patient seen by Dr. Pepper, in consultation, who finds a consolidation of the left base, apparently a post-operative pneumonia with pleurisy.

No urine has been voided since catheterization twenty-six hours ago. The bladder cannot be percussed, perhaps on account of tympanites.

Circulation seems fair, but pulse is rapid and blood pressure is only 90 systolic.

11/9/22. The patient has been delirious all day; very restless; respiration rapid and shallow. Temperature 103° F. White cell count 32,000. The entire left base involved as well as the upper lobe. Loose, unproductive cough.

Patient died at 11:30 P.M., fifty-nine hours after operation.

DISCUSSION

It seems apparent that some unusual feature supervened—such a fulminating pneumonia with death within fifty-nine hours is rare; the patient's condition, from the time he returned from operation,

was unusual. The pulse remained above 112 until the end; the temperature steadily rose to 103° within the first twelve hours. A terminal temperature of 106° was recorded. The respirations were slightly increased after operation and eighteen hours later reached 32.

A loose cough appeared the afternoon of operation. The following morning 1/75 of atropine was given because of his loose cough, and râles noted at the left base. This was ineffectual. With left sided consolidation, a leucocytosis of 34,000, fever and dyspnea, a diagnosis of left lobar pneumonia was made.

The interesting feature in this case, if we accept the findings of Bullowa, is that a left pulmonary edema was probably precipitated by the ligation of the vasomotor fibers to the vascular bed, with immediate fall in blood pressure, as noted on the anesthesia record, and dilatation of all the left pulmonary vessels. With the congestion and edema thus established, a rapid invasion of organisms and a terminal pneumonia resulted.

The case is one which may be offered as clinical evidence of a thoracic segment control of the pulmonary vascular bed, and is unique in our experience with laminectomies during and immediately after the operation.

We cannot help but feel that some disturbing influence, producing a marked pulmonary congestion and edema, preceded a rapid invasion and terminal pneumonia.

The nitrous oxide anesthesia was of short duration and almost the entire operation was done under local anesthesia.

The possibility of pulmonary complications must be borne in mind when undertaking nerve or posterior root destruction of this area.

Reflex irritation from the roots causing vasodilatation is one physiological explanation.

1924 Pine Street.

SOME OF THE FALLACIES IN PRESENT-DAY SOCIAL REFORM *

FREDERIC J. FARNELL, M.D.

When Shakespeare wrote that "Never came reformation in a flood" he had in mind the experience of mankind up to his time. Could he have looked 300 years into the future his conclusion would have been just the reverse. At no time in the history of the human race have there been proposed so varied and manifold means and agencies for social amelioration as within the past fifteen or twenty years, and perhaps in no country are those agencies so active as in these United States. To-day is the day of the reformer. His name is legion. By the sheer force of propagandism he has made himself respected and feared.

For every social ill, real or imaginary, the reformer has his never failing remedy in the advocacy of which he has boundless enthusiasm, but it is the enthusiasm of a single track mentality which equally implies a supreme confidence in the efficacy of his own pet schemes and an intolerance to all others. Being human, the social reformer is subject to the limitations and restrictions imposed by nature and by the conventionalities of society, and the fallacies discoverable in his proposals are largely due to his failure to fully recognize *those* two great facts. I have no pet theories to offer for your consideration, nor do I intend to profess any other interest except to assist, if possible, in bringing before your attention what one might consider a few probabilities why radical social reform promoted by a few, forced down the throats of all, cannot bring about a peaceful social organization. Again, do not think for one moment that I am satisfied with the existing social arrangement or that I am not in sympathy with the desire to bring about radical changes in society.

To head off, therefore, any personal criticism, let me say that in pointing out what I regard to be some of the fallacies in the claims and practices of the social reformer I disclaim all pretensions to superior wisdom. At the same time I assume the almost natural right and privilege of expressing an opinion as to the doubtful wisdom of making exaggerated claims and demands upon society in the furtherance of one's own views. One cannot but recognize this

* Read before the Rhode Island Medico-Legal Society, October 25, 1923.

fact, that in order to adjust such problems life must depend upon the socialization of human thought and character.

Society as we recognize it cannot be socialized any faster or farther than the human units of which it is composed can be socialized. However, an almost universal intensive reform movement is taking place especially emphasized by the sociologists under the caption of social hygiene. Primarily social hygiene means good social living with a proviso in the mind of the social hygienist that he must be a judge of what is good for the individual as well as for the social organization. The reactions of this movement are necessarily two-fold: primarily the reaction of the social hygienist to himself and his own work; and secondly, the reaction of the social organization to the efforts of the social hygienist. The first has reference to the intensive reactions of the reformer, and it includes his repressions, his purposes, his promptings; that is, his motivations which are essentially his own reactions to his own mental conflicts as well as to the mental attitude he takes towards the conduct and the behavior of society. These reactions are often little more than defense reactions against some difficulty existing within himself, and are distinctly different from the reactions of the social organization. He probably reasons that that which is repressed by him as improper, others should repress and hence regard as improper. It rarely occurs to him, while conducting a propaganda, that the social reaction may be entirely different from what is anticipated. This is aptly stated in a quotation from "The Fundamental Claims of Laborism and Socialism" as follows:

"When we get into the realms of the imagination and picture the fully evolved socialistic state we build air castles whose only foundations are our wishes, desires, hopes, in a word, our dreams. Unrealized and unrealizable wishes are the materials around which our dreams are organized. Your socialistic state is such a system of dream organization. Between the realities of life and dreams there is no continuous series of gradation; nor is there any transition stage between the two. Whatever hardships, evils if you choose to call them so, exist with respect to our monetary system, they are inseparably connected with it, and as intelligent men we should devote our energies to easing the burdens thereof rather than wasting our energies in seeking the unattainable."¹

It is not only necessary to know the proposed assumption but it should be also necessary to know the probable discontent, the hopes,

¹ Personal communication to the author.

the fears, the queries, the spiritual possibilities, and the visionings of the human mind as well as the aftermath in years hence and the alternatives to the proposed possibilities. These new movements should be intensely studied and an analysis of the men and women whose ideals and yearnings those expressions and statements aim to represent is most urgent.

Social forms and institutions change very slowly, especially in response to propaganda, and yet a relative change may be rapid under great economic developments. The rut of any habit of living, if persisted in long enough, will sink to a level below consciousness or into the subconscious, and be apparently quite out of reach of the associations with intelligence. It will soon take unto itself a probable controlling influence, an appearance of having an absolute authority. When once this has taken place, it becomes quite evident that every adaptation we offer to that problem which, in the beginning, gave rise to that habit will, without a doubt, receive an unconscious pull from that early fixed pattern. If one should apply these principles to civic problems one might reason somewhat as follows, using as our problem the building of a new road or a bridge and our educational or institutional systems. It would follow that it should be very easy to reorganize our educational or institutional systems out of our stripped consciousness because we have been thinking about them for many years, and since it has long ago formed a pattern in our subconscious mind. But not so with reference to the new road or bridge—they have not gone below the level—this is what should happen. As a matter of fact, we all are aware it is far more easy to build a new road or a new bridge as compared to the reorganization of our educational or institutional systems. Why! A frank refusal, obstinacy, negativism, and feelings of being at a disadvantage, so common a reaction in certain types of neuroses and psychoses, play also a great part in the swing of adjustments in habits and traditions formed by group or herd consciousness such as is seen in social, political, or economic organizations.

A generation ago the social reformer was largely a self-trained individual with no financial backing. In his restricted circumstances social sufferings and inequalities, crime and misery of every kind were forced upon his attention. From observation, much thinking, and a powerful desire to relieve society of its evils, he evolved his cure-all.

The present generation of reformers are to a great extent educated men and women, oftentimes especially trained but always well supported financially. Yet it is questionable whether the panaceas

of the latter are any better than those of their predecessors. Has the actual analysis of the personality of a reformer, whether he be a hygienist or not, been carefully scrutinized? If not, let us for a few moments enumerate some of his characteristics. To begin with, they are usually extreme egotists; they are emotional and impulsive in their judgment and they crave excitement. They are dogmatic, contradictory, and hero-worshippers. Naturally, they have only one fixed idea, their pet cause.

When an individual develops a fixed idea and shows emotional variations to the degree that he carries his thoughts and feelings into action so as to govern his daily life and interfere with his work, his judgment is immediately questioned. And yet if the fixed idea has sufficient financial backing, and you are all aware that all these issues are maintained almost without exception by the wealthy men and women,² it is with great ease that the reformer, call him what you will, a Lenine in Russia or a Coué, an immense following is soon gathered. Coué came to America and in a short time had thousands of the susceptible American people, including many physicians (who ought to know better), in his audience. His fixed idea, his absolute conviction in himself, his presumed power, his pseudomagnified ability, soon influenced the minds of thousands so that in a very short time Coué clubs and "Coué courses" sprang up here and there. Only recently an announcement was received from one of our leading sanatoriums in which they emphasize the fact that they use Coué methods in the treatment of their cases.

How is one to interpret such a reaction? One cannot call it genuine and sincere! Is it not an emotional response, a sort of a verbal hypnosis in which a new name for one that is time worn creates an enthusiasm almost to the degree of hysteria? Hysterics suffer from ruminations and dream in symbols. Ideas and expressions frequently make no appeal under their old and familiar titles, but will create a tremendous furor when labeled under a new and even better under an unfamiliar name.

The social reformer has the utmost confidence in the power of words, and the phrase "*be it enacted*" to him are creative words of a new and perfect dispensation. He is either unable to appreciate the fact that human nature, on which all social activities of every

² Also a characteristic type—individuals who manifest a lust for power call for the censoring of movies, books, plays; ask the police commissioners to close the dance halls at ten; initiate curfew ordinances; promote the rehabilitation of "blue laws"; cry against women smoking—anything at all merely to swell their ego and disturb the mode of living of thousands—nay, millions.

name and nature rest, cannot be changed by a "*be it resolved*," or he refuses to recognize that fact, and what he does not recognize does not therefore exist. That the institutions of a nation, the imperceptible growth of many generations, are impregnable to legislative attacks is beyond his comprehension, and he mistakes the slight surface movements of social activity for deep-seated principles. New movements said to be based upon tradition, and yet paradoxically bearing no likeness except in the name and words used, show as a general rule a complete lack of spirit behind.

Nothing is more stable in the human race than the inherited groundwork of thought. This groundwork is essentially the sentiments, the feelings, and the passions which undergo but slight changes from age to age. The elements of civilization are rooted in religious, political, and social beliefs, matter of sentiment, between which and the new conditions of existence and thought created by modern scientific discoveries and industrial advances there is a continual and ever-increasing conflict. But the modern social reformer is by no means the mouthpiece of this discontent. Social discontent is rooted in economic inequality, yet this class of reformers to which I have particular reference are not reformers in an economic sense. The slogan of our type is, "Come on—let us remake mankind and the world according to our patterns."

Another fallacy in the domain of social reform is the fear or failure to call a spade a spade. Conclusions of investigators and authorities in the field of abnormal psychology are made use of by the social reformer in a way and a manner and for purposes never so contemplated by the original investigator. They, also, will quote enthusiastically and freely statistics³ of crime, vice, evil, poverty, etc., and derive their information from the press, believing unquestionably that since it was published it must be a correct authority. Through their aggressiveness and their persistence in making themselves heard they create a false impression in the minds of others. Such has been the case with psychoanalysis. The majority of the individuals who discuss and use psychoanalysis possess a biased reasoning power for the study of this deep subject; they only know isolated facts gained by reading popular books which are often very crude and very far

³ Statistics are repellent to all but the statistician—such data never did nor can they furnish an explanation of the deep-seated causes which operate in, upon and determine the conduct of the aggregate of humanity. Statistics record apparent facts—a sort of an accounting—a column of figures, the units of which, considered statistically, differ from each other in no respect and yet a few hundred men and women out of a hundred millions of people can and largely do, in important respects, shape the opinions and actions of the remainder on such data.

from actually expressing the thoughts of the students on that subject. Many of them treat the fundamental text of psychoanalysis in the same way as they do the Bible, quote it and refer to but never read it.

On the other hand, it is an interesting fact that all the unfavorable criticisms which research has brought forth in relation to psychoanalysis, whether it has been directed against the validity of such researches or against the value of the same, have usually been contradictory. Most of these criticisms have centered themselves around the prominence given by Freud to the sexual element as a causation of various forms of nervous and mental diseases. This has always been considered a disagreeable topic which is usually closed to our eyes and which has always had attached to it a moral reaction doubly emphasized by religion and our education. It has even been claimed that Freud mischievously introduced notions of a sexual type into the minds of individuals and initiated in their minds a misconception of the medical attitude incident to sexual phenomena. Others believe that sexual influences other than morbid are so widely prevalent that they have no more to do with the upsetting factors in psychoneuroses than they do in any other form of disorder, and that they therefore cannot play such an important part. This entire attitude, it seems to me, these prejudices, are really fallacies.

What is psychoanalysis? Psychoanalysis is the name given to a method of investigation which has been developed for reaching down into the depths of the individual's mind to bring to light the underlying motives and determinants of his symptoms and attitudes which may reveal the unconscious tendencies which lie behind his certain actions and reactions, and which in turn influence the development and determine the relations of himself to life itself. By so going below the threshold of consciousness a mass of material quite out of relation to previously held values has caused, on account of being unfamiliar, a stronger antagonism and a stronger criticism.

It was originally used as a therapeutic agent for the sick, but it soon became recognized, through the analysis of normal people, that there were only slight differences as far as the content of the conscious and unconscious mind of the sick and of the normal were concerned. It was merely a difference in the way the one reacted to life, to the conflict, produced by the contending forces in that individual. Those conflicts, not in keeping with the conscious ideas, then produce symptoms which might be manifest through certain opinions, prejudices, attitudes, symptom complexes, diseases, etc. One might look upon psychoanalysis as analogous to surgery. An individual presents himself with an abscess of the arm, for example—

an abscess is an accumulation of pus caused by an infecting organism. It gradually enlarges in size, producing a secondary inflammatory reaction around it as well as causing more or less pain. The surgeon is then called, and with the scalpel, at a point of election, incises the abscess, allowing the free flow of pus, which relieves almost immediately the tension and the pain. So it is with psychoanalysis. It is these small accumulations of feeling which cause more or less mental tension or physical pain. The analyst is then called, and at the point of election incises by free conversation the small accumulation of emotion and allows them to have a free flow, thus relieving the tension and pain. But frequently psychoanalysis does not succeed—surgery occasionally does not succeed. They aim at parallel results—one the repair of the body and the other the repair of the personality. It should also be obvious that the mere fact of analyzing an individual is quite different from adjusting an individual to a disorder.

The snag which is met with in psychoanalysis is the meaning of the word "sexuality." Freud never meant it to be interpreted as a gross act, as it is so recognized in the popular sense. Freud conceived sexuality to be synonymous with love, and love includes those tender feelings, emotional reactions, esthetic reactions, ethical reactions, moral reactions, ambitions, friendship, companionship, business associations, etc., etc.

The social reformer unacquainted with these facts, and failing in his attempt to reach the desired result, faces the grave situation of an increase in evil, vice, and crime. The social hygienist, to perform his work best, should first carefully and critically examine his own motives, ascertain the source of his own mental conflicts, allow himself to pass through a process of analysis with a view of determining whether he is honest with himself in his efforts to compel others to live according to his creative formulae. Should it be disclosed that he is particularly liable to fall from civic grace through the particular repressed course of conduct he is objecting to in others, it then behooves him to consider whether in removing temptation from himself by removing temptation from everybody else he is not really opening the door for more serious temptations towards vice and crime than those sought to be removed by the reform.

But the social reformer does not do this. His mind, his idea, is concentrated on his own pet object, that is, upon himself.⁴ It does not occur to him that his feeling for the need of removing temptation

⁴ Analytically the egotist considers his own judgment as the only true one and he looks down with scorn and despicable recognition on all who have not gained such a depth of knowledge and intelligence as is his. It is a self-deification.

has not been experienced by his neighbors and friends, and that possibly his repressed thoughts and feelings, with their associated conflicts, are foreign to them. The social reformer, being so wrapped up in his own feelings, so egoistic and carried off into creative ideals, is apt to neglect the fact that there are millions of individuals who have not experienced the need of reform, and owing to this mental attitude he fails to consider the possibility or probability of untoward social reactions to his enforced manner of living.⁵

We have no more earnest social reformers than the prohibitionists, who, up to only a few years ago, were known as Anti-Saloon Leaguers. As a league, in politics they formed an insignificant party—for years their polled vote was less and less, and at the outbreak of the war it was a negligible factor. However, coincident with the war measure for conserving food products the manufacture of liquors was prohibited, and through our peculiar system of politics the league leaders, with the whole country in an emotional turmoil, were able to induce Congress to propose an amendment to our Constitution whereby not only the manufacture was prohibited but also even to have the smallest quantity of liquor on one's person became a serious and punishable crime. During the war, expression by the manufacturer in opposition was suppressed for obvious reasons, and the possibilities of the future ignored by the reformers. They claimed we would need no more jails, crime would disappear, taxes grow less, and an ideal sober nation result therefrom, most assuredly elements of nearsightedness in their field of vision, with utter neglect of the objective as a whole.

What have we at this time? Crime was never so prevalent, drunkenness hardly ever so common.⁶ Liquor smuggling extends

⁵I have chosen to quote from an address entitled "The Influence of Psycho-analysis Upon American Psychiatry," given by the author at Berlin, September, 1922.

⁶Report, 1922, Municipal Court of Philadelphia (through the courtesy of Mr. Leon Stern, Educational Division). "An analysis of the records of 3,832 families (Domestic Relations Division) in 1915 showed that in 38.2 per cent of these families alcoholism was cited by the wife as a cause leading to non-support by the husband. In 1916 the percentage increased to 41.1. For the six months prior to July 1, 1919, when the 'War-time Prohibition Act' became effective, the percentage of families in which alcoholism was an important cause showed a decrease as compared with the previous data—from 41.1 to 30.2. After July 1, 1919, this percentage decreased month by month with slight fluctuations until it reached the extremely low level of 6.6 in February, 1920, the month following the date on which the National Prohibition Act became effective. Since February, 1920, the percentage has gradually increased until at the close of 1922 it reached 27.3, a somewhat higher percentage than was shown prior to the month when the 'War-time Prohibition Act' became effective."

Personal communication from Mr. Leon Stern gives figures for January, 1923, 26.8 per cent; February, 1923, 28.8 per cent; March, 1923, 31.6 per cent. "It has steadily risen until now it is on a level with pre-Volstead days."

over thousands of miles of coast lines and boundaries. We have even asked Great Britain to help us to enforce our laws. Perhaps a more careful analysis of the motives and a consideration of herd reaction might have prevented this disaster. That the social hygienist has failed to take into consideration the popular reaction to his reform is quite evident. An analysis might have helped him forecast his results. It has shown him that there is a species of crowd-mindedness that sumptuary laws are unable to meet satisfactorily.

A few days ago the executives of the majority of the states of the Union gathered in solemn conclave around the conference table in the White House to devise ways and means of enforcing the laws—no, not the *laws*. More murders are committed in the one State of New York yearly than in the entire British Isles. But the conference did not discuss the ways and means of enforcing the laws against homicide. Never in the history of the country was crime so prevalent as to-day, but the governors did not discuss ways and means of stopping theft, highway robbery, or other crimes against property and person. The one subject to which they devoted their entire and undivided attention was the enforcement of the provisions of the Volstead Act, legislation fostered and fathered by the social reformer and based upon the fallacy that legislation can change the tastes of the individual, tastes inherited through a thousand generations of mankind. This class of social reform was to close up the jails and prisons of the country, reduce taxation, and make a law-abiding people. Is there any doubt as to this being a fallacy? No state prison has yet closed its doors, no jail has yet been turned into a shirt factory; on the contrary, there is a growing demand for more institutions of that character. As to taxation, the hundreds of millions of dollars once received from liquor taxes and license fees have been added to and are now being collected from the already overburdened taxpayer.

Another fallacy that this class of social reformer falls into is that the more stringent, the more exacting, the more drastic the law is made the better will it be respected and obeyed. The story of prohibition enforcement shows the fallaciousness of the proposition. You cannot make a nation of Johnsons, of Wheelers, and Andersons, of Claypoles and Tarbells, by an act of Congress. We are now about to increase our force for "dry enforcements," ask for more appropriations, a greater coöperation from Great Britain and Canada—bring into play our navy and airships, etc., and when all these agencies of our governmental strength come into play it will be found that they will force by repression those demanding feelings and actions, and it will be seen that that spirit of "I'll do it anyway" will flourish in dark and secret channels, much as fungi and bacteria

which flourish in dark and dirty places where the sunlight never penetrates.

Anything corrective which brings out of one's self or out of a group an anti-social reaction, which prohibition has done to the utmost degree, cannot be considered fundamentally and primarily useful in raising the standard of society.

Alcohol is of prime importance in chemistry, industry, and medicine. What can be more fallacious than the doctrines that by restricting and limiting its use to minimum quantities its usefulness and potency are increased? That by surrounding its use in science and industry with "absurd distinctions, unwarranted restrictions, and almost intolerable conditions" you increase its utility and value in scientific investigation and industrial development?

The Alcohol Trades Advisory Committee, in a recent report, stated: "While the future use of alcohol will be coextensive with the progress of chemical industry, there are a few uses the expansion of which will be more or less revolutionary in character, such as in the perfection of liquid motor fuels to supplement the rapidly diminishing supply of petroleum suitable for the purpose and other adaptations which are at this time the subject of practical experimentation and scientific research. From where is the essential future supply of alcohol for governmental, industrial, and scientific purposes to come? Under present conditions of prohibition law enforcement we have real cause to be concerned, etc." Then, too, one must be extremely careful in referring to long-established customs when those customs have the sanction of dogmatic theology. Tut-ankh-amen's tomb is to be opened shortly to the public, and I venture to say that the investigators will find on the walls of the tomb scenes picturing that monarch as offering libations of wine to his god. That was 3,000 years ago. To-day certain religious ceremonies, to be righteously observed, require the use of liquids containing 15 to 20 per cent of alcohol. Is that a fallacy? Or is it a fallacy on the part of the modern reformer to assert that the individual, in his everyday life, commits a crime when he has in his possession a beverage 51/100ths of 1 per cent of alcohol? Dry advocates constantly challenge every issue, whether it be health, economic, industrial, scientific, or social, where alcohol is concerned. It even reaches a point of a pronounced denunciation of the logical thinker and a passionate indulgence in the defense of his own views which sometimes seem to admit of evidence of moral inconsistency and insincerity. A fallacy of this type should make one wonder whether one was really not dealing with a pathological condition even to the extent of a psychoneurosis or even a psychosis.

Herbert Spencer said: "When it was enacted in Bavaria that no

marriage should be allowed between those without capital, unless certain authorities could 'see a reasonable prospect of the parties being able to provide for their children,' it was intended to advance the public weal by checking improvident unions and redundant population; a purpose most politicians will consider praiseworthy and a provision which many will think well adapted to secure it. Nevertheless this apparently sagacious measure has by no means achieved its end. In Munich, the capital of the kingdom, half the births are illegitimate."

The social hygienist cannot view the ever-increasing divorce rate in the United States without alarm. Each state has control over divorce in its territory, and the reformer is now bent upon centralizing these state functions in the federal government at Washington. An attempt is being made to prohibit divorce as near as may be, as well as to prescribe who shall or shall not marry. Suppose we have success with these efforts, then the peculiar predicament arises that one forces divorce laws upon states who have no divorce laws and increases the causes for divorce in states where only one ground is allowable. In the agitation going on over this very important subject directly related to the preservation of species, the reaction of the herd, the people of the country, is not given any consideration. Should this be regarded as ignorance, the apparent lack of recognition of the compensatory effects of repressing the procreative functions? To be sure, social hygiene means good living which is based upon "what is good for me is good for all." But it does not work out in that manner. Such a divorce law would soon force into play not only abnormal sexual reactions, some with a repression and the later development of a neurosis or psychoneurosis, but also perversions, and promiscuous sexual activities with a resultant increase in illegitimacy.⁷ This would result in more vice, more crime, more unhappiness, more inefficiency, and more disease.

⁷ "The following shows the number and percentage of illegitimate births since 1890 in one of our large cities:

Year	Births	Per ct.	Year	Births	Per ct.	Year	Births	Per ct.
1890....	36	1.05	1901....	93	1.98	1912....	145	2.49
1891....	68	1.72	1902....	80	1.69	1913....	125	2.07
1892....	65	1.65	1903....	90	1.82	1914....	139	2.27
1893....	92	2.21	1904....	106	2.05	1915....	130	2.23
1894....	67	1.63	1905....	90	1.72	1916....	118	1.97
1895....	82	1.98	1906....	108	1.98	1917....	141	2.21
1896....	91	2.21	1907....	115	1.96	1918....	144	2.20
1897....	74	1.80	1908....	119	2.04	1919....	105	1.81
1898....	70	1.52	1909....	127	2.26	1920....	114	1.78
1899....	104	2.42	1910....	110	1.92	1921....	118	1.79
1900....	83	1.84	1911....	124	1.91	1922....	113	1.77

Thirty-three years: Births, 3,386; per cent, 1.99."

One observes while carrying on social work among the poor many fallacies in reform, and with great ease may bring out traits of antipathy and vindictive retaliation because the desires or wishes of a reform worker are not carried out to his or her satisfaction. One might say that many workers interpret their cases syllogistically, especially so in relation to the mentally defective, the illegitimate child and the criminal. The social reformer will invariably emphasize such facts as the mother of an illegitimate child must be defective or she would not have had the child, and should be "shut up"; or that every defective child is a potential criminal and should be housed or sterilized or what not; or that every criminal, regardless of the type of offense, is abnormal, a defective, or an epileptic, and should be placed accordingly. There is no special factor in the mental constitution of a criminal that is absent in a law-abiding citizen; many times the difference is merely one of being or not being in the hands of a social service organization or the law, and when one considers the large percentage of classified defectives disqualified by the draft boards, men who had reached their mental level and have and do live in society without conflict, but who, according to our reformers, are potential criminals, it would follow that our jails in the near future should be bigger than they are at present.

Does not such an unguided expediency demand that we undertake to discover the deep-seated realities which go to govern the movements of our human life? That the herd or society in general refuse to accept much, at this time, on the ground that it is incompatible with life and human nature is obvious. It may be that we have never closely analyzed our views, not because it was unnecessary but because we were not fully aware of the facts as they are laid down in our scheme of life. Might not our future depend not only upon our presence but also upon the method we use in an honest expression of ourselves to others? As individual members of society we must remain calm and cool, and mutely allow ourselves to be overwhelmed by the fact that one has no individual value—that is, we are merely unimportant units of a whole. But the fact is that our new psychology teaches us differently, that personality, environment, attitude of mind, instincts, and individual as well as herd reactions, play a great part in the scheme of our social life. This has proven to be an opening up only of the natural operations of the human mind. The same principle psychoanalysts apply to their patients in searching for the hidden meaning of mental and physical reactions should be applied to searching and tracing out the realities of our social interrelationship. To avoid this essential feature, as

social reform in and of itself is bound to do, will always result in the handling of all our problems through the emotional field, and the result will be similar to the explosion of so many blank cartridges. This can undoubtedly be corrected, in a large measure, by rationalization, through the field of intelligence.

Only one more point: It is easy to criticize or pull down; it is difficult to build or reconstruct, but probably if we leave off all this propaganda for or against certain things, forms, and types of social organization, and get right down to the examination of the actual intrinsic value and relations of man to man, we may be on the eve of a new discovery—a healthy discontent quite essential and a prerequisite to success.

These are offered as suggestions or fallacies and not as a review of the field of social reform. Raleigh said, "Criticism after all is not to legislate, nor to classify, but to raise the dead." A large part of society is dead—dead to our major problems. Why should they not be alive to the other side of these important questions? In the past they have reacted through herd suggestion—maybe in the future they will be individualized.

Tennyson said, "Have patience, ourselves are full of social wrong; and maybe the wildest dreams are but the needful preludes of the truth."

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THE INFLUENCE OF INTERCURRENT DISEASES UPON THE COURSE OF CERTAIN PSYCHOSES *

CONSIDERATION OF THE PATHOGENESIS

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PHILADELPHIA

Infectious diseases may at any period of their evolution bring out latent psychoses or *per se* create psychic disorders of various character. They may also have a favorable influence upon a preëxisting mental disorder. Therefore the subject of interrelationship of somatic and mental disturbances presents two aspects. We will be concerned here only with the latter aspect, namely, with the effect of an intercurrent affection of an infectious or of any other character occurring in the course of a fully developed psychosis of a long or short duration.

As far back as in 1844, Jacobi, in his *Hauptformen der Seelenstörungen*, and in the subsequent few years von Rienecker, Griesinger, Heumann, Kraft-Ebing, Régis, Kraepelin, Fielder, and many other authors, reported satisfactory influence of intercurrent diseases or of spontaneous suppuration on the course of mental disorders.

The psychoses which have benefited by the interjected somatic diseases are of a wide variety: Mental depression; hyperkinetic and expansive states of the manic-depressive insanity; persecutory delusions of the paranoid type; delusive and hallucinatory states in cases of dementia precox, and senile dementia; agitated states of involutional melancholia; schizophrenic states; psychasthenic episodes; abnormal tendencies and abnormal psychic reactions, especially in psychopathic children; finally, epileptoid states.

The intercurrent somatic disturbances which have favorably influenced the preëxisting psychic states are as follows: Typhoid fever, malaria, erysipelas, variola, scarlatina, cholera, pneumonia, pleurisy, acute inflammatory rheumatism, hemorrhages, gastric disorders of an acute character; finally, suppurative conditions and traumata of the cranium.

As to the degree of improvement in the psychoses, various accounts have been recorded, ranging from some amelioration or from remission to complete recovery, and this was the case not only in the acute

* Read before the Psychiatric Society of Philadelphia.

psychoses and in mental disorders of recent date, but also in chronic psychoses of long or very long standing, such as in dementia precox or in paranoid states, or in cases in which unfavorable prognosis was admitted.

One then observes that agitation and anxiety of melancholia agitata gradually subsides and finally disappears; that confusion, disorientation, negativism, and stereotyped attitudes become replaced by normal behavior; that affective and emotional indifference and indolence of dementia precox become very much less profound and in some cases totally disappear; the tension of the psychomotor inhibition of schizophrenics is greatly diminished so that they gain a better grasp of surroundings. Whether it is only a temporary remission, as Weygand sees it, or a more prolonged improvement, the records differ. Improvement is also seen in a group of unclassified cases with a great variety of psychotic phenomena, and in some cases there is a return of certain psychic functions which have lost their activity. In manic states the expansion and excitement not only subside but in some cases totally disappear. Catatonic states in various mental affections, even in schizophrenia, improve. A very instructive case is recorded in the *Münchener medizinische Wochenschrift*, 1923, p. 415. A twenty-one-year girl suffered from severe chorea following an angina. Fever appeared. The choreic restlessness held on for weeks, and at the same time the patient developed great disturbance of attention, disorientation in space and time. Typhoid fever then set in. Rapid amelioration of the mental phenomena as well as of the choreic state took place. The patient finally made a complete recovery.

Hallucinatory phenomena equally improve or disappear in the course of various mental disturbances of any nature. Very recently I had the opportunity to observe and study five cases with gross psychic manifestations which greatly improved after intercurrent maladies made their invasion.

Case 1. Mrs. A. E., age thirty, married, with negative Wassermann of blood and spinal fluid, was in her manic phase of manic-depressive psychosis, of which she had four attacks at various periods of her life since the age of sixteen. The present attack was very severe. Her hyperkinetic state was much pronounced; at times she would become disoriented, but this would last but one hour. Her expansive ideas were chiefly in the direction of her accomplishments (music and literature). She was extremely talkative; could not sleep and drank large quantities of water. The condition existed for six months. On one rainy night she insisted on going out without additional clothes. Upon her return she felt chilly. Her tempera-

ture showed 102. Bronchopneumonia developed. Very soon, only four days later, a decided change took place in her mental attitude. She became more manageable and accessible. Her ideas became less and less expansive. She was able to criticize them and often interrogated the nurse and relatives as to the cause of the former expansion. She was particularly concerned about the reason of her having grandiose ideas with regard to her music, while she knew perfectly that her talent was only mediocre.

The febrile disease was a protracted one, but she finally recovered. Her mental manifestations totally disappeared in the third week of the intercurrent affection.

At the time of writing these notes six months have elapsed and there has been no return of the psychosis.

Case 2. Mrs. N. F., thirty-six years of age, had been suffering from periodic attacks of depression for the last twenty years. In all, she counted up ten attacks. Several months ago she came under the writer's observation in a very deep state of depression of eight months' duration. Despair, utter hopelessness, total indifference and apathy towards her children, loss of interest in every activity of which she used to be very fond, occasional visual hallucinations, insomnia, agitation at times, several attempts of self-destruction, were the symptoms present and persistent. For a long time she complained of pain in the rectum. Examination revealed the presence of hemorrhoids. Once, while being very much constipated, she attempted the act of defecation. One of the large hemorrhoidal veins ruptured and a very profuse hemorrhage followed. The patient was frightened, became almost pulseless, and lost consciousness. Restoratives brought her back to consciousness, but the bleeding continued. On the third day the bleeding was arrested. The amount of blood lost was considerable. Interestingly enough, the mental phenomena became ameliorated almost immediately; there was no more of the former sense of despair; hopefulness took its place. Gradually the patient improved and finally recovered. It is now the sixth month since her hemorrhage and so far there has been no return of the depression with its usual satellites.

Case 3. A. M., male, thirty-four years of age, presented at the time of the examination his second attack of mental depression, which was of five months' duration. The clinical picture was largely similar to that of the previous case. Crying spells, groaning and moaning over the utterly hopeless state of health, a strong inclination to commit suicide, were all the main outstanding features of the mental state. Like Case 2, he also had hemorrhoids with frequent bleeding. He became emaciated and pale. An operation was urged on him. After a long delay, during which time the mental condition remained unaltered, he finally consented to surgical intervention. During the succeeding days a remarkable improvement commenced to make its appearance. On the fifth day after the operation the patient's countenance changed: he became more talkative, less shut-in, more communicative, more agreeable, and more appreciative for any-

thing the attending nurse did for him. He commenced to speak of what he might do and undertake after he leaves the hospital. The world, in his own words, "appears to him different": he sees the false situation in which he formerly lived; he desires ardently to live "and continue to supply for the family," and he feels the obligations, "the fulfilling of which is not a burden to him, but rather a pleasure." The patient made a complete mental recovery. The satisfactory result is still maintained five months after the operation.

Case 4. C. B., aged twenty, presented during a period of eighteen months fluctuating brief phases of extreme exaltation, followed by periods of extreme depression. In the former there was an unusual voracious appetite, with restlessness and a very pronounced tendency to use profane language. In the latter there was a succeeding state of stupor, motor immobility, with a catatonic attitude. Resistiveness with a tendency to carry out orders diametrically opposite to the meaning of the requested ones was striking. For example, when the patient was told to flex his head, he extended it; to stretch out a limb, he flexed it; to lean forwards, he leaned backwards; to open his mouth, he closed it tightly with the teeth held firmly together, etc. This antagonistic motor reaction with the general immobility was so persistent that a diagnosis of Catatonia of dementia precox variety was thought of during many months. Subsequent events, however, proved it to be a case of toxic psychosis with catatonic manifestations as the patient made a complete recovery.

During the catatonic state the patient contracted lobar pneumonia. The latter ran a typical course. When the temperature was at its height a subsidence of the mental symptoms was in evidence. The inhibitory phenomena, the antagonistic behavior to external stimuli, the immobility, were all gradually decreasing. There was no stupor and no depression. During the crisis of the pneumonia there was not a trace of the former psychosis. The patient is at present in the seventh month after his illness and no recurrence of any of the above manifestations took place.

Case 5. P. McM., male, twenty-nine years old, music teacher, commenced to show periodic paranoid attitudes towards his own parents, also brothers and sisters. At the examination of his last attack he was in a state of hypomania: slight exhilaration, some talkativeness, and erotic tendencies were present. On several occasions he showed aggressiveness and considerable hostility towards his mother, for whom he always exhibited great affection. He became disinterested, indifferent to his work, and gradually lost all attachment to relatives or friends. He had to give up all his former activities in his field of work; he confined himself to his room and refused to see anyone. Close inquiries revealed the fact that from a very early age the patient presented indications of mental abnormality. Frequently he showed loss of interest in the emotional sphere, and at that time he would isolate himself, would avoid people, including his near relatives, for days, and then he would become moody and irritable. The patient evidently belonged to the

schizophrenic type. In the mental episode under the present discussion the patient underwent an unusually severe mental shock. He happened to be on a train in the direction of Pittsburgh. A collision occurred and the train was derailed. Among many others he was found unconscious, and he remained so for twelve hours; he also sustained a fracture of the right thigh and a lacerated wound of the scalp. During the succeeding days the patient gradually lost his hostile and suspicious attitude. He became more accessible and more reasonable. He was very inquisitive as to the outcome of his injury. He inquired about his parents, became sympathetic and solicitous with regard to their feelings. He asked to see friends, conversed with them, became quite talkative. He preserved this return to normal mentality during the entire period of his convalescence. Not a trace of his former psychic condition was present during the following eight months. Lately I was informed that he is commencing to show evidences of another episodic attack of the old psychosis.

The five cases are conclusive illustrations of a beneficial effect of intermittent disorders upon the course of some psychoses. The literature contains quite a number of records of this character, and all authors agree upon the favorable influence of somatic disturbances on psychic disorders. But the pathogenetic relationship of the two has not been as yet satisfactorily solved. In order to understand it one must try to understand what is introduced into the economy by the intercurrent morbid agent, what is the morbid agent in the preëxisting psychosis, why should the first be antagonistic to the second, and of what does this antagonism consist.

Let us consider briefly every one of these problems. (a) What is introduced by the additional morbid process? In cases of infections we know that soluble products (microbic secretions) are spread in the organism through the circulation, producing general and focal morbid phenomena. In noninfectious cases we invariably deal with some toxic agent introduced into the organism: in intoxications there is an organic or inorganic element; in disorders of nutrition we witness not infrequently external or cutaneous evidences of the action of an intrinsic poison. When all such diseases terminate, one observes elimination of the toxic products, particularly in the urinary secretions: there is a urotoxic discharge of all obnoxious elements accumulated in the organism during the diseased process. In the struggle of the two forces, which goes on until one of them remains victorious, the chemical constitution of the organism is modified and new material is being elaborated which is antagonistic to the toxic material produced by the invading agent. The formation of anti-toxic substances in the organism is the most important feature in any diseased process.

(b) The second problem for discussion in our thesis is to determine what pathogenetic forces are at work in any given psychosis. In this domain the field of speculation is very wide. In our endeavor to arrive at a definite understanding of the nature of psychic disorders we are undergoing a serious internal struggle. Various propositions and theories have been advanced by workers in morbid psychology, but it seems that not one is sufficiently strong for a proper conception of the subject. Each of them has its logical place and is substantial enough to explain some of the morbid phenomena, but a universal application of any one to all sorts of psychic manifestations is within our present knowledge out of the question. A tolerant attitude towards all possible views will enable us perhaps to arrive eventually at a reasonable understanding of psychic processes. In toxic psychoses in which the mental manifestations are the direct consequence of the effect of the toxic material accumulated by the original infectious agent, in which the delirious or confusional states accompanied by hallucinations run frequently parallel with the temperature, in which convalescence is accompanied by abundant elimination of highly toxic material—in all such cases the direct influence of morbid chemistry in the organism is etiologically responsible for the mental disorder. In paresis, as well as in other psychic disturbances which simulate some well-known psychoses, syphilis and its products may be the only causative agents. In all such cases, particularly in the latter, antisyphilitic remedies administered vigorously and for a long period of time render great assistance. Alcoholic intoxication, saturnism, disturbances in the function of the endocrine glands, are all apt to create directly mental symptoms, which may subside and even disappear when efforts are made to eliminate the organic poison, thus showing an etiological relationship of the two. In uremia the clouding of consciousness, the disorientation, the depression or else the euphoria, the delirious state, the hallucinations, are all directly dependent upon a special toxicity of the organism; when the latter is removed the first also disappear.

The same phenomena are observed in constitutional affections such as diabetes, gout, chronic rheumatism. In this group there is a special diathesis or a permanent morbid predisposition to profound nutritional changes. It consists of an insufficient oxidation of the nutritional waste material and of accumulation in the organism of the products of incomplete combustion. When mental disorders arise in these conditions and subside or disappear, when the latter improve, the interrelation is evident. The few examples here presented indicate beyond doubt that at least some morbid mental manifestations

and even some fully developed psychoses are created by extrinsic or intrinsic toxic agents, and consequently their pathogenesis is of a chemical character.

At this juncture it may not be superfluous to consider together the two propositions already discussed. It was pointed out that the formation of antitoxic substances in the organism is the most important feature in any diseased process of infectious character. In the case of psychoses we have seen so far that at least some of them have a chemical pathogenesis. When a diseased process of somatic origin intervened in the course of a psychic malady, antitoxic substances of one react upon a toxic material of the other. Otherwise speaking, we observe two forces which are essentially of a chemical character. Since the intercurrent affection reacts favorably upon the course of the psychoses, the two forces are naturally antagonistic to each other—one overcomes the other. What it means in terms of chemistry we do not know. A study of the metabolism in psychoses before an intercurrent disease makes its invasion, also a study of the metabolism after the intervening process occurs, may elicit some facts of enormous importance, particularly with regard to the therapeutics of such conditions.

This view can be maintained only with regard to certain psychoses in which a toxic element is in etiological evidence and in which the intercurrent affection is equally of an infectious or toxic character. But not in every case of psychotic disturbances could one attack infection or intoxication as having a direct relationship, also not every case of intercurrent disease is of an evident toxic nature. Cases 2, 3, and 5 are illustrations of inapplicability of the above view. In Case 2 we find periodic attacks of depression with occasional hallucinations during a period of twenty years. The patient suffered from hemorrhoids. A profuse rectal bleeding occurred. Improvement at first and complete disappearance of the mental condition later followed.

In Case 3 there was also depression in its second attack and of five months' duration. A surgical operation for hemorrhoids was followed by a radical change in the mental condition of the patient.

In Case 5 we deal with a man showing at different times of his life paranoid tendencies or sudden loss of interest in the emotional sphere, during which time he would lead a shut-in existence. He evidently belonged to the schizophrenic type. A severe trauma occurred, followed by fracture of a bone. Prompt disappearance of his psychotic disorder followed, and recovery was maintained during

a period of eight months. Later on, when the writer saw him last he commenced to show a recurrence of the old psychotic symptoms.

In the literature cases have been reported analogous to the above three. Lehmann (1) reports a case of a woman of fifty suffering from melancholia agitata with hallucinations. After an attack of profuse hematemesis the depression, apathy, the state of anxiety, and hallucinations lost considerable of their intensity, and within four weeks the patient made a complete recovery. Schüle (2) records the case of a subacute persecutory state disappearing after the invasion of a severe gastritis. Aetius with Fielder (3) saw cases of melancholia cured, following epistaxis. Esquirol (4) and Amelung (*Allgemeine Ztschr. f. Psychiatrie*, VII, p. 437) reported similar occurrences in maniacal cases. Perfect (*Annalen* Fall 43) and Esquirol (*loc. cit.*) observed cases of recovery of maniacal frenzy after hemorrhoidal hemorrhages. Schenck (6) reports a case of melancholia recovered after a trauma with injury of the leg. Chiarugi (7) observed disappearance of maniacal agitation following the onset of a profuse menstruation.

In attempting to apply the above enunciated metabolic principles concerning the interrelation of some psychoses and intercurrent morbid processes to the series of cases just mentioned, one meets strong obstacles. It is difficult, if not impossible, to invoke antagonistic chemical elements in cases of melancholia, of mania, or of schizophrenia with episodic psychotic outbursts interrupted in their course by a shock due to trauma or to profuse hemorrhages. However, this conception could have its legitimate place if by a stretch of imagination we admit that shock or trauma or loss of blood are capable of altering the humoral contents to such a degree as to produce in the organism new antibodies antagonistic to and more powerful than the hypothetical toxic material which, according to some authors, is the fundamental basis of psychoses in general. But to take such a position would be to assume too much.

In looking for an explanation of the fact why a sudden loss of blood or a surgical operation or a trauma are likely to arrest a morbid psychic process, one is obliged to make an appeal to a few data of experimental physiology. A loss of blood or a trauma (surgical or accidental) produce an intense emotion especially in individuals who are physically diseased. Strong or painful emotional experiences are followed by increase of adrenin secreted by the suprarenal glands. This occurrence calls forth the stored carbohydrate from the liver and increases the sugar content of the blood. It also gives a better blood supply to the central nervous system, lungs, and heart. Such

reaction to emotion is not voluntary but automatic and of reflex nature. The suprarenal glands are innervated by fibers of the autonomic system (in its middle division). Curiously enough, adrenal secretions and the autonomic system (middle portion) produce identical results when stimulated. There are reasons to admit that disturbances of the sympathetic system are increased by adrenal secretions. E. G. Kemp's well-known studies (8) strongly indicate that emotions have a peripheral origin in certain motor sensory functions of the autonomic apparatus; that the nature of the emotions is regulated by the state of tension of the autonomic apparatus at any given time; consequently the autonomic functions determine the behavior of the organism. When the autonomic tension becomes excessive, it cannot be controlled, and for this reason confusion in psychomotor functions is created. As a result, we have incoördinations, errors, obsessions, dissociation of personality, hallucinations, delusion—all special features of psychoses.

Applying these highly important observations on the physiology of the autonomic apparatus to the chief subject of the present study one finds no special difficulty in forming an adequate conception of the influence of intercurrent diseases associated with a strong emotion on psychotic disturbances. Since the latter is the result of affective conflicts with loss of conscious control of the affective states, and therefore spontaneous affective adjustment is wanting, the new emotional elements introduced by an intercurrent disorder act as a specific affective stimulus: they condition the primary affective complex and by readjustment of the elements of the latter free the personality from the disturbing conflict. Physiologically speaking, in the terms of Kemp, one witnesses a struggle between different states of tension of the autonomic apparatus, between the incoming and the already present states.

The conception of the mechanism just described appeals very strongly for a logical explanation of the pathogenesis of disorders in the psychic spheres and of the mutual effect of emotional or affective states of different origin. We see in it a "rapprochement" between physiological and psychological methods of investigation in the realm of mental phenomena.

In the first part of the present study attention was called to a perfectly satisfactory pathogenesis in the domain of pathological physiology and chemistry. In the second part we attempted to demonstrate that while such a pathogenesis has its legitimate place in certain forms of psychoses, it cannot, however, be universally applied that there are conditions in which a purely chemical construction of

events is not adequate, but a structure built up on psychological combined with physiological elements renders the problem of mental phenomena more accessible and admissible. Purely physiological or pathological as well as purely psychological interpretations of mental occurrences are not sufficient nor satisfactory, since they cannot cover the entire field of abnormal psychic phenomena; but when psychological speculations are corroborated or at least connected with facts or anatomy and physiology, as Kemp is endeavoring to do, such an attempt should be welcomed and given a serious place in the midst of the bewildering efforts to understand morbid psychic phenomena.

Recently P. Courbon (9) proposed a somewhat different interpretation of the influence of an intercurrent affection upon psychotic phenomena. It has this advantage, that it covers all cases, not only the acute psychoses with invasion of febrile diseases, but also the cases with purely emotional etiological elements such as we related above, also cases with chronic psychoses, such as paranoia, cases of dementia, etc.

Courbon admits that in psychotic individuals there are two sets of psychic neurones: normal and diseased. They work alternately. That diseased neurones, in spite of the presence of the healthy neurones, may functionate exclusively, is not surprising. As an example of it, we may call attention to Monakow's diaschisis, according to which a lesion confined only to few anatomical elements may produce a radical disturbance of a certain function. The same want of a parallelism between the intensity of a lesion and a function was amply proven during the great war.

Inhibition of one set of psychic neurones by another may be observed in either direction. The mutual antagonism of certain diseased states, and consequently the disturbances produced by an intercurrent affection, is entirely comparable to the effect of curative sera.

It stands to reason that when new elements introduced by an intercurrent affection are brought in contact with diseased psychic neurones, which are naturally more vulnerable than the sound ones, they will disturb them very readily and even paralyze them; otherwise speaking, they will remove the inhibition which the latter exercised over the other neurones. As soon as the inhibition is removed the means of communication between various areas of the brain are reestablished: the affective perversions, errors of judgment, defect of memory, all of which were the result of the activity of the morbid psychic neurones, all disappear. The suspension of the psychic disorder may be complete or incomplete, permanent or else subject to

recurrences. The difference in the degree of improvement or of recovery evidently lies in the qualitative variation of the cerebral substance in different individuals.

Like the previous views on the pathogenesis of psychoses, the present one is also speculative. Nevertheless, in view of its logical character, it should be given a legitimate place and considered from a tolerant point of view.

There remains for us to consider an additional feature of the subject under discussion, namely, the therapeutic aspect. The satisfactory influence of an intercurrent disease upon the course of psychosis contains in itself a therapeutic suggestion. Some investigators have obtained very instructive results from a febrile state produced by inoculations of bacterial cultures, by injections of toxins, of protein (nucleinates, peptones, etc.), or else by producing a leucocytosis by means of an artificially formed abscess. It seems that an infection artificially induced presents a powerful and promising field in the domain of therapeutics of psychoses, provided that the degree and intensity of the infection could be determined beforehand in each individual case and its nocivity measured. The first attempt in this direction occurred when Robertson, Lewis Bruce, and Wagner-von Jauregg conceived their serotherapeutics of paresis. Berger (10) has shown that catatonic and stuporous states are favorably influenced by injections of cocain. Wagner-von Jauregg, in defense of the well-known malarial treatment of paresis, proposed a treatment with the vaccine of staphylococcus and with tuberculine as a means of inducing fever. Good results from such a treatment have been recorded by some writers. In their opinion the rise of temperature alone may be the healing principle in paresis, because spirochetæ cannot stand a temperature above 40° C.

Merklen and Minvielle (11) report a case of a man of thirty-one in a state of profound depression. Injections of colloidal gold produced headache, fever, chills, and leucopenia. The mental symptoms rapidly improved: he became more accessible, talkative, and he resumed his former activities. Logre (*ibidem*) reports three cases of melancholia with a state of great anxiety improved from antityphoid vaccination. Similar observations were made by Laignel-Lavastine (*ibidem*), who obtained an amelioration from the first injection. For a period of nine days there was total abolition of all the elements of anxiety neurosis and of vagotonic manifestations in Tinel's case from injections of horse serum. Kahn (*ibidem*) obtained good results from injections of nucleinate of sodium. In Hartenberg's case

(*ibidem*) all the symptoms of melancholia disappeared through a violent reaction produced by very strong doses of strychnia.

In a work entitled "Chocs therapeutiques contre chocs morbides," Bouche and Hustin (of Bruxelles) study anaphylactic shock in man, and especially vascular disturbances following injections of crotalin. They describe under the name of "choc vasotrophique" a syndrome which could be produced experimentally and which is observed in the course of various physiological and pathological states. For example, in determining an anaphylactic shock in the uterus one may bring on a sanguinous excretion analogous to menses; the metrorrhagic consequently may be considered as a vasotrophic shock. It is logical, therefore, to institute a treatment of such occurrences which is based on a corresponding therapeutic shock. Convulsive phenomena have been observed following introcerebral injections of sera. They are indicative of a local anaphylactic shock. The treatment of such condition should be based upon the inter-reaction of vasotrophic phenomena. Epilepsy, the authors believe, will first be benefited by this method, and with it several diseased states which are related to it, such as migraine, paroxysmal attacks of facial neuralgia, etc.

Following the line of thoughts of the Belgian authors, it is logical to assume that the beneficial results obtained from various treatments mentioned above may be due to the principle of anaphylaxis, and that the antagonistic behavior of intercurrent affections in the course of psychoses may be after all an anaphylactic phenomenon.

In reviewing the entire subject under discussion, it appears to the writer, first of all, that each of the views concerning the pathogenesis of the psychotic phenomena has valuable features as far as certain affections are concerned, but by no means do they cover the entire field of psychiatry. The same lack of totality is encountered in the mode of influence of a somatic affection on the course of a psychic affection. Therapeutics, such as management of paresis by the serum of malarial patients, appears to be a judicial approach to the solution of this difficult problem, since it is based on scientific data of experimental physiology. Clinical observation followed by experimental investigations on a large scale is indispensable for a clear understanding of the intimate interrelation of somatic and psychotic phenomena. Finally, a plea is made for a broader and more tolerant attitude towards different views concerning the pathogenesis of abnormal psychic manifestations, since, as we saw on the foregoing pages, not one of them *per se* is broad enough to be applied to every individual case.

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THE CEREBROSPINAL FLUID

A SUMMARY OF THE PRESENT CONCEPTIONS OF ITS PHYSIOLOGY AND CHEMISTRY

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The present paper aims to present in a brief form a summary of the present conceptions of the more fundamental points with regard to the physiology and chemistry of the cerebrospinal fluid. This field is far too large to give consideration to any except the more outstanding points in a brief paper of this nature. For the details the reader is referred to the recent excellent works of Levinson,(1) Boyd,(2) or Lochelongue,(3) or to the original articles referred to in the paper.

I

THE PHYSIOLOGY OF THE CEREBROSPINAL FLUID

1. *Origin.* The question of the origin of the cerebrospinal fluid has been a source of much dispute and the question is not entirely settled at the present time. Is it a secretion, a filtrate, a transudate, or is it a dialysate derived from the blood plasma? The significance of this question is better grasped if we think of the problem as presented in pathological conditions, where there are changes in its various physical factors—pressure, amount, color, and chemical constituents—protein, sugar, and other substances.

The sources: (1) The choroid plexuses. This is probably the chief source. The evidence for this is based on four methods of experimentation:

(a) Pathological: In 1913, Dandy and Blackfan(4) were able to occlude the Sylvian aqueduct by a gelatin capsule, and produced thereby an internal hydrocephalus. This would indicate that the fluid was secreted above the aqueduct. In a later work, Dandy(5) has given us more conclusive proof. He removed the plexus from one lateral ventricle and blocked the corresponding foramen of Monro of the opposite ventricle. On examination of the animal three months later, he found the ventricle from which the plexus had been removed, reduced to a slit, while the corresponding blocked ventricle had produced a hydrocephalus.

(b) Histological: Mott(6) has described the presence of vacuoles in the choroid plexus taken from human beings soon after death. These he considers a positive evidence of secretory activity. These vacuoles have been corroborated by several other workers, but Meek(7) explains them as artefacts resulting in the preparation of the slide. Pettit and Girard(8) noted these changes, and while they considered them as possible evidence of secretion, they suggest that they may be due to post-mortem changes.

(c) Physiological: In 1901, Cavazzani (9) noted the marked decrease in alkalinity of the cerebrospinal fluid compared to the blood, which led him to the conclusion that it was a secretion. Kafka (10) noted that the epithelial globules in the choroid plexus were increased after an injection of pilocarpin.

(d) Weed and Cushing (11) found that pituitary extract increased the flow of the secretion, while thyroid diminished it. Dixon and Halliburton (12) produced an increase in the flow by a choroid extract. Various observers—Kafka,(10) Pettit and Girard,(8) Cappelletti(13)—have noted an increase in the rate of flow after an injection of pilocarpin.

From these four sources of evidence, namely, pathological, histological, physiological, and pharmacological, we may conclude that the chief mode and source of origin of the cerebrospinal fluid is through the secretory activity of the choroid plexuses.

(2) The secretion from the choroid plexuses receives accretions from the ependymal cells lining the ventricles. Francini(14) noted secretory phenomena in these cells after the injection of ether.

(3) From the perivascular channels all over the surface of the cortex. The fluid amount from this source is small and passes directly to the subarachnoid space. Jackson (15) suggests that it may arise from the metabolic activity of the brain cells themselves. Weed (16) has proven this source rather conclusively by the precipitation of prussian blue in these channels after injection.

(4) From the posterior lobe of the hypophysis, the secretion passing by way of the stalk to the third ventricle. This amount represents the secretion of the hypophysis. Cushing and Goetsch(17) demonstrated some years ago the presence in the fluid of a substance which gives the same reaction as extracts of the pars nervosa, and have come to the conclusion that it is such.

2. *The Rate of Formation.* The rate is unknown. It has been definitely shown by Falkenheim and Naunyn (18) that secretion is continuous. In fractures of the skull it has been observed to drain off steadily at the rate of 200 c.c. or more per day (Howell,19).

From the work of the above writers there appears no relation between body weight and the rate of formation. Cases of cerebrospinal rhinorrhea are reported by numerous writers (Thompson,20 Kutzinski,21 Constantin,22) showing a secretion of from 100 to 900 c.c. per day. Kutzinski noted in his case an increased flow with both bodily and mental activity. No conclusive work has been done regarding the normal rate, though repeated attempts have been made by the injection of various substances into the blood stream.

3. *The Amount.* Normally the amount varies to considerable extent, and is difficult to state accurately. Approximately there is in all about 120 to 150 c.c. (Jackson,15). The amount is said to increase with age, after puberty, as the brain shrinks in size (Stillman,23). The fluid present in the subarachnoid space at death is rapidly absorbed.

4. *Circulation.* Jackson (15) has very admirably presented this subject recently, in which he states there are two general paths of circulation; in both cases it flows from the ventricles out the openings of Magendie and Luschka to the subarachnoid spaces at the base of the brain, beneath the tentorium, where are located the cisterns of the pons, medulla, and cerebellum. The first path of circulation leads out over the surface of the cerebrum and the second smaller portion passes down the ventral aspect of the spinal cord to the cauda equina, and returns along the dorsal aspect to augment the stream which bathes the cerebrum. The question of the circulation in the spinal subarachnoid space is somewhat disputed. Weigeldt (24) found from analysis of over 1,500 lumbar punctures at various levels that the amount of albumin and number of cells progressively increased from the cervical to the lumbar region. Stewart (25) also concludes from experimental work that the circulation in the cord region is probably minimal in degree. Thus the validity of intraspinal treatment is much disputed, and it may be noted here that from a physiological basis the evidence is rather against the rationale of intraspinal therapy.

The possibility of the circulation of the cerebrospinal fluid within the brain substance has not been conclusively or even successfully demonstrated at present. Nañagas,(26) by injecting the precipitate of prussian blue, was able to trace the color into the brain substance, but proof that it circulates within the substance of the brain remains to be established.

The forces in the circulation of the cerebrospinal fluid: While there is no pump analogous to the heart to maintain the circulation, Jackson (15) holds that it finds its way about much as does the

venous blood from the extremities. According to Howell,(27) the chief factors in returning the blood from the limbs is through respiratory movements, contractions of the muscles of the extremities, and viscera. The analogy drawn here to the venous system cannot well be made in view of the fact that there is no factor corresponding to the muscular contractions. Further, the venous circulation is only possible through the aid of venous valves, which do not have any homologue in the spinal fluid circulation. Hence it is not plain how it may be compared to the venous circulation from the extremities. Jackson further states that there is a force exerted by the secretion of the plexuses. This is materially assisted by the pulsation of the brain and gravity. Jackson assumes a negative pressure in the dural sinuses as compared with the subarachnoid fluid which is of some assistance. It seems to the writer that an important factor in the circulation might be the convection and absorption currents.

5. *Absorption.* The absorption takes place by three routes :

(1) Chiefly through the great dural sinuses, by a process of diffusion through the microscopical arachnoid villi, directly into the blood. This has been demonstrated by Weed,(28) Stewart,(25) and others, and is now generally accepted.

(2) A minor portion is absorbed through the lymph stream by way of the lymph sheaths of the cranial nerves. Hill,(29) Ziegler,(30) and Spina (31) demonstrated this by the injection of methyl blue into the subarachnoid space. Weed (16) injected ferric ferrocyanide and found it in the sinuses and perineural lymph vessels, but recovered none from the veins or capillaries of the cortex or brain substance.

(3) Possibly some is absorbed in the spinal subarachnoid space by way of the lymph system, in view of the absence of dural sinuses or arachnoid villi (Stewart,25).

The rate of absorption, like the rate of formation, is unknown. Much experimental work has been done in this field in an effort to determine the rate by injection of various dye stuffs, recovering them from the stomach, thoracic duct, and other points. No conclusive work has been done, but the fact is established that the rate of absorption varies to a considerable extent. Physiological saline, when injected into the subarachnoid space under some pressure, is absorbed with surprising rapidity (Howell,32). Foley (33) claims that there is a resorption of the fluid by the choroid plexuses under the influence of an intravenous injection of hypertonic salt solution. In any case the rate of absorption depends probably on the rate of

formation, and the latter must be known before the rate of absorption can be determined.

At present little weight is given to the ideas of Mott (6) regarding the major absorption through the perivascular lymphatics, or to theory of absorption through the Pacchionian bodies as suggested by Schwalbe, Key, and Retzius.(34) The theory of Bohm (35) and others who claimed the absorption through the stomata in the meninges has no real foundation. C. v. Monakow (36) has recently suggested the theory that there are separate pathways for the soluble and insoluble cell products, the fluid being taken up chiefly by the venous plexuses and sinuses and the nonsoluble cell products carried away by scavenger cells to the Virchow-Robin perivascular spaces, thence to the lymph spaces of the meninges, and finally to the cervical lymph nodes.

6. *Pressure.* The normal pressure is influenced by many factors, varying with the apparatus used, the age, position of the patient, respiratory movements, etc., but as a rule varies from 45 mm. to 90 mm. of water in children, and from 130 mm. to 150 mm. in adults, these figures being for the recumbent position, as given by Levinson.(1) A withdrawal of fluid temporarily reduces the pressure but normally returns rapidly.

In practically all pathological processes involving the meninges there is an increase in pressure. Probably this pressure is due to a disturbance in absorption with a continuation of the secretion of the fluid. Mehrtens (37) believes that the increased pressure is a probable indicator of the amount of destruction having taken place, and in the presence of a high cerebrospinal fluid pressure one should consider the possibility of disease being either in a state of remission or that it has been arrested or cured, leaving some destructive changes.

7. *Permeability of Choroid Plexus.* It has been known for some time that normally very few substances can pass from the blood into the cerebrospinal fluid. This has been assumed to be due to the impermeability of the meninges and the impermeability of the choroid plexus. In 1921, Stern (38) made a very complete study of this problem, and found that certain substances passed readily into the cerebrospinal fluid, though generally less than the blood concentration, and some substances did not pass into the cerebrospinal fluid except for very minute traces, or not at all. His experiments were carried out on animals on which he had performed a double nephrectomy. The substance was introduced into the peritoneal cavity or under the skin. It is of interest to note some of the substances used

and his results. He found that the following substances passed from the blood to the fluid fairly readily: sodium bromide, sodium salicylate, sodium sulphocyanate, sodium picrate, morphin, atropin, santonin, strychnine, and bile salts. He found that another group of substances, which did not differ in any general way from the above group, did not pass from the blood stream into the cerebrospinal fluid: sodium iodide, sodium ferrocyanide, curare, eosin, uranin, methyl violet, bile pigments, and antibodies including cytolytins, neurotoxins, and precipitins (these last done in immunized animals). Fluorescein markedly stained and distended the choroid plexus, but was not in the fluid. He concludes from his experiments that the "hemato-encephalitic" barrier is physiological and not anatomical. He simply states that the mechanism is unknown. Substances which were found in the fluid were also found in the brain tissue, which is in contrast to the ideas held by Sachs,(39) Dercum,(40) and others, who criticize the intraspinal treatment of neurosyphilis because they hold that it cannot be demonstrated experimentally that substances injected subdurally can penetrate the cortex of the brain, and that changes in the spinal tissue are beyond the reach of the remedies in solution in the fluid. Further, Stern (38) noted that when any substance was found in the brain tissue it was found in the fluid. This is noteworthy with regard to the possible circulation of the fluid within the brain substance, which has never been demonstrated.

Cavazzani (9) and other workers have demonstrated that potassium iodide is very slightly or not at all absorbed into the cerebrospinal fluid after intraperitoneal injection. Lewandowsky (41) has shown that a few cubic centimeters of sodium ferrocyanide injected into the subarachnoid space results in death, while from four to six grams can be injected into the jugular vein without any effect. Behring (42) could find only traces of antitoxin in the cerebrospinal fluid after intravenous injection. Further, he demonstrated that subcutaneous and intravenous injections of tetanus toxin in hens produced no effects, while subdural injections resulted in rapid death.

Other substances known to pass are urotropin, alcohol, and chloroform. Crowe,(43) Hald,(44) and others, have demonstrated the passing of urotropin from the blood stream into the spinal fluid, and for this reason it is advised by some for use in meningeal infections. The advisability of this is very questionable, as Crowe points out, in that the antiseptic action depends on the conversion of this substance into formaldehyde, which must be accomplished in an acid medium, and since the spinal fluid is slightly alkaline the

urotrophin remains unchanged. Further, the concentration is too small to be of value. While urotrophin has been detected, no formaldehyde has been detected. It may be noted at this point that Wegforth and Essick (45) found that even a subarachnoid injection of lysol or potassium permanganate in the presence of an otherwise fatal meningeal infection did not prolong the life of the animal. Schottmüller and Schumm (46) found a greater concentration of alcohol in the spinal fluid than in the blood, demonstrating that alcohol is concentrated in the cerebrospinal fluid.

With regard to arsphenamin, Boyd (2) points out that while it may pass through the blood-spinal-fluid barrier, it is in very minute doses, since large intravenous doses may be given without toxic effect on the brain, while minute doses injected into the spinal canal may be fatal. Mehrtens and MacArthur (47) noted arsenic could be found in the spinal fluid of 43 per cent of cases after intravenous injections of arsphenamin. This number was not increased by complete drainage of the spinal fluid, but was increased to 92 per cent, which showed penetration when injected six hours after meningeal irritation. Reiger and Solomon (48) found arsenic in the spinal fluid in 30 per cent of cases following intravenous injection of arsphenamin. Barbat (49) found 31 per cent of cases punctured twenty minutes after intravenous injection gave positive tests for arsenic. Weichbrodt (50) also states that arsenic is nearly always found in the fluid after intravenous injection, and that it has been found in treated cases in the brain substance. Other workers have noted the presence of arsenic in the spinal fluid after intravenous injections of arsphenamin (Sicard and Block, 51 Camp, 52 Ravout, 53 Benedict 54).

Certain pathological products may pass when the membranes are known to be unaffected. Acetone, diacetic acid, lactic acid, bile salts, chlorides, sugar, and other substances may increase in systemic conditions. Mestrezat (55) demonstrated that in the human, normally, sodium nitrate is not passed into the spinal fluid, but in meningitis it is present in large quantities.

No conclusions can be drawn from our knowledge of the permeability of this hemato-encephalitic barrier, as Stern has termed it. "There is a vast variance between the transmissibility of chemical and immune substances in health and in disease, and although we may not know whether the meninges or choroid plexus are entirely impermeable in health, we do know that they become permeable in disease—a fact of great importance in the genesis and also in the diagnosis and treatment of the diseases of the meninges" (Levinson, 1).

8. *Function of the Cerebrospinal Fluid.* Magendie, (56) many years ago, gave its function as follows: "The cerebrospinal fluid, which is barely mentioned in the classical works, not only fills out the empty spaces in the skull and spinal canal, it has a greater function, mainly to exert a continual and regulated pressure on the neuron masses." The fluid does play a very important mechanical function, giving support and protection to the brain and cord. Dercum (40) states that it is preëminently a fluid for the hydraulic suspension of the brain and cord; its function is essentially hydrostatic. However, there are other ideas regarding its function, and while Dercum further states that it plays no rôle in nutrition, Halliburton (57) considers it does have a nutritional value: the sugar present serving to supply energy and the protein to repair wear and tear. Mott (6) believes it to be the absorber of oxygen and sugar from the blood and to pass on carbon dioxide and water to the blood. Cushing (58) has suggested that it is the medium for the distribution of the pituitary secretion to the central nervous system. Boyd (2) has suggested that it protects the central nervous system from harmful substances in the blood. However, Mott's idea regarding the passage of carbon dioxide is not readily compatible with the very slow circulation of the fluid. Nor, as has been mentioned under permeability, has the presence of toxins in the fluid been shown. To the present time the only function with a firm foundation of proof is that of its mechanical or hydrostatic function.

II

THE CHEMISTRY OF THE CEREBROSPINAL FLUID

The general chemistry of the cerebrospinal fluid appears superficially as very simple. Boyd (2) describes it in a word by stating that the fluid differs from distilled water in that it contains traces of a few salts, a trace of albumin, a trace of sugar, a trace of urea, and is slightly alkaline in reaction. Dercum (40) says it is essentially an innocuous .75 per cent saline solution, which is absolutely neutral and negative. However, this simplicity is only superficial, for its complexity is well shown by the Wassermann test, the colloidal gold reaction, and other special reactions. The fact that the fluid is almost "normal," so called, in a condition like multiple sclerosis, indicates our extensive ignorance of the complexity of this fluid.

The chemical constituents that have the most direct bearing on differential diagnosis and the pathogenesis of various diseases include the protein content, the organic index, the sugar content, lactic acid,

urea, and cholesterol, among the organic constituents, and the phosphates, chlorides, and carbon dioxide, among the inorganic constituents. Other very important points for diagnoses of conditions from the cerebrospinal fluid include its cytology, the colloidal gold reaction, the mastic reaction, and the Wassermann test.

1. *Protein.* Under the term protein is included globulin, which is present in .02 per cent to .03 per cent, and traces of albumin, ranging from .01 per cent to .06 per cent. Globulin is an albumin which is precipitated by half saturation with a salt. A simple efficient test for globulin is the Nonne-Appelt,(59) Phase I, the globulin, if present, forming a white precipitate on addition of a cubic centimeter of spinal fluid and a cubic centimeter of saturated ammonium sulphate solution. The Pandy (60) test is also satisfactory and is simply performed by dropping two to three drops of spinal fluid into a few cubic centimeters of clarified 10 per cent phenol solution in a watch glass. Turbidity results if globulin is present. Southard and Solomon (61) state that the presence of globulin in measurable amounts is always an indication of abnormality in the cerebrospinal axis. There is nothing differential in this finding as it occurs in all inflammatory processes. However, it is characteristically present in most cases of neurosyphilis with the exception of the pure vascular type, which does not show globulin in a very high per cent. Levinson (1) also states it is present in cord tumors and in any case of pressure on the cord. It should be stated that Noguchi's (62) globulin test is also reliable and is carried out by adding two parts of spinal fluid and five parts of 10 per cent butyric acid, boiling, and then adding one part of normal NaOH and boiling. Excessive protein will precipitate.

Albumin, as was stated, is present in small quantities in all spinal fluids. Increase over the normal occurs in pathological conditions, according to Southard and Solomon,(61) and especially in those conditions in which globulin is found. Any albumin precipitant may be used to demonstrate its presence—as 33 per cent trichloroacetic acid.

2. *Sugar.* A reducing substance was noted in the cerebrospinal fluid as early as 1852, and has since produced much discussion. It has been variously assumed to be pyrocatechin, galactose, a xanthine body, and other substances, but recent studies show it to be a dextrose, as proved by the phenyl-hydrazine test, the fermentation test, and the polariscope.

The normal sugar content, according to Mestrezat,(55) averages .053 per cent, and may range normally from .048 per cent to .058 per cent. Foster,(64) at Massachusetts General Hospital, found a

normal average in twenty-two cases of 0.052 per cent. Leopold and Bernhard (65) found the average in children to be 0.07 per cent and normally as high as 0.10 per cent. It varies with several pathological conditions, the cause of which is stated by Kahler (66) as due to either abnormal permeability of the choroid plexus for sugar, or an abnormally copious secretion of glucose by the plexus cells. Yoshimura (67) demonstrated glycogen in the plexus cells, which he regarded as the forerunner of sugar in the spinal fluid. Kahler (66) further states that abnormal metabolic processes in the brain may lead to an increase in the sugar content. Boyd (2) agrees with this last in that he says its presence is associated or intimately concerned with the metabolism of the nerve centers, and its presence or absence may be regarded as an index of the activity of the metabolism which is taking place.

The decrease of the sugar content in suppurative conditions of the meninges, when due to meningococcus, pneumococcus, or streptococcus, is explained by the fact that these organisms ferment glucose, and hence its decrease or absence in these conditions. The tubercle bacillus does not ferment glucose, and hence the decrease in sugar in tuberculous meningitis is usually slight or not at all.

The sugar content is unchanged in syphilis of the brain or cord, as it is also in anterior poliomyelitis, multiple sclerosis, brain tumor, arteriosclerosis, hemiplegia, and neurasthenia. It is increased in diabetes proportional to the blood sugar. Various results have been obtained in encephalitis, most of them indicating the presence of increased amounts of sugar. *E.g.*, Foster (64) found an average sugar content in eleven cases of encephalitis as 0.076 per cent, compared to a normal in twenty-two cases of 0.052 per cent.

3. *Organic Index*. This index is the amount of permanganate required to oxidize the organic substances in the fluid. Mayerhofer, (68) as well as Levinson, (1) have shown the organic index to be increased in all the meningitides. Boveri's (69) test is used to indicate pathological amounts.

4. *Lactic Acid* is normally present only in very small traces. It is increased in cases of suppurative meningitis.

5. *Urea* is also present only in traces in the normal fluid, 0.06 per cent or less, but in cases of uremia and nephritis it has been reported as high as 8.7 per cent and 4.5 per cent. Some workers have noted its increase in cases of arteriosclerosis, with symptoms pointing to involvement of the central nervous system (Levinson, 1).

6. *Cholesterol* is present in normal cerebrospinal fluid in only very small traces, or may be absent. Levinson, Landenberger, and

Howell (70) have pointed out that the usefulness of the cholesterol determination in the spinal fluid for diagnostic purposes is limited, because of its presence in hemorrhage of the brain, in some cases of meningitis, and also occasionally in general paresis.

7. *Inorganic Constituents.* Phosphates are found increased by Donath (71) in conditions of rapid nerve degeneration, as in tabes dorsalis, cord injury, and brain tumor. Chlorides are usually increased in nephritis. Carbon dioxide varies somewhat normally, and decreases on standing.

8. *Cytology.* The normal spinal fluid contains from 3 to 6 cells per c.mm., though various writers place the normal limits from 0 to 10 cells per c.mm. of fluid. These cells are all leucocytes, and are practically always lymphocytes in normal spinal fluid, though large lymphocytes may very infrequently occur. Normally no red cells are present. A lymphocytosis is generally characteristic of a chronic condition, while a polynuclear leucocytosis is characteristic of an acute condition.

For convenience, spinal fluids may be roughly divided into three groups, depending on their cell content:

- (1) Clear fluids—appear as distilled water.
 - (a) Normal fluid: contains not more than 4–6 lymphocytes per c.mm.
 - (b) Meningismus: cells sometimes remain in normal numbers, sometimes increased; fluid is sterile.
 - (c) Tuberculous Meningitis: cells increase as high as 500 (usually less) per c.mm., with mononuclears predominating. Fine fibrin web forms on standing twenty-four hours.
 - (d) Anterior Poliomyelitis: cells increase, rarely higher than 300 per c.mm. Early they are largely polynuclear leucocytes; late, lymphocytes predominate.
- (2) Clear or slightly turbid fluid.
 - (a) Cerebrospinal Syphilis: cells increase as high as 500 per c.mm., with lymphocytes predominating about 60 to 40 over polynuclear leucocytes.
- (3) Turbid fluids (purulent).
 - (a) Epidemic Cerebrospinal Meningitis: fluid yellow in color; cells increase as high as 40,000 per c.mm., with about 95–98 per cent polynuclear leucocytes; the intracellular meningococcus is usually very scarce.

- (b) *Pneumococcus Meningitis*: fluid is usually greenish in color; cells increased as high as 20,000 per c.mm., with polynuclear leucocytes about 90-95 per cent; pneumococci very numerous.
- (c) *Streptococcus Meningitis*: usually *S. hemolyticus*; fluid less turbid; cells increase to 15,000; chiefly polynuclear leucocytes.
- (d) *Pfeiffer's Bacillus (Influenza)*: may set up a turbid fluid, though much less commonly.

Lymphocytosis also occurs in sleeping sickness, according to Spielmeier,(72) According to Jelliffe and White,(73) lymphocytes have been found increased in a few cases of multiple sclerosis and also in herpes zoster. These workers (74) also state that lymphocytosis is not infrequent in epidemic encephalitis.

9. *Colloidal Gold Reaction.* Zsigmondi (75) showed that albuminous substances may be differentiated through their reactions with colloidal gold solutions. Lange (76) applied this principle to the protein of spinal fluid and found that when the normal fluid is diluted with a 0.4 per cent sodium chloride solution the colloidal gold was not affected, while pathological fluids caused changes in the gold solution characteristic of the disease. Solomon and Koefod (77) state that the reaction depends on an excess of albuminous material or abnormal albumin constituents in the fluid. In the case of spinal fluid, it is found that in certain disease conditions the colloidal gold is thrown down by the addition of the fluid as it would be by an electrolyte. The changes occurring in certain diseases are specified for those diseases. The technique now most generally used is that of Lange, modified by Miller (8) and his colleagues at Johns Hopkins.

10. *Wassermann Test.* The Wassermann test based on the Bordet-Gengou (79) complement fixation reaction is the same for cerebrospinal fluid as for blood, except that because of the absence of the complementary or anticomplementary substance inactivation is unnecessary, and a larger amount may be used than in the case of blood serum. Southard and Solomon,(61) in their elaborate work on neurosyphilis, state the following diagnostic significance which is still the prevalent view of Wassermann interpretation. Positive indicates syphilis, except very rarely in acute febrile conditions such as malaria and pneumonia. Negative does not exclude syphilis. In obscure conditions a series of less than three negatives has very little diagnostic significance. Doubtful suggests syphilis. It is therefore advisable to submit three or more specimens in such a case, and

interpret a persistently and predominatingly doubtful reaction as indicative of syphilitic infection.

11. *Mastic Reaction*. Emanuel (80) simplified the Lange colloidal gold reaction, using a solution of mastic, the resin of a certain tree bark. The test works on the same principle as the Lange test, and further corroborates the physiochemical specificity of disease. A similar test has been described using benzoin.

SUMMARY

The physiology of the cerebrospinal fluid we may summarize:

1. Origin: Most evidence shows it to be a secretion, chiefly from the choroid plexus, with minor sources, as the ependymal layer of the ventricles, the perivascular channels over the surface of the cortex, and the posterior lobe of the hypophysis.

2. Rate of Formation: The rate is unknown, but there is a constant secretion.

3. Amount: Varies with many normal and pathological factors, but averages normally about 120 to 150 c.c.

4. Circulation: Circulation probably takes place, but with a very slow rate, specially in the cord region. Various forces were mentioned. Any circulation of the fluid within the brain substance has yet to be established.

5. Absorption: Takes place chiefly through the great dural sinuses direct to the blood, and also much less through the perineural lymph sheaths of cranial nerves, and possibly through lymph spaces in the spinal cord region. The rate of absorption depends on the rate of formation, and is unknown.

6. Pressure: Normally varies with many factors; pathologically, an increase occurs, with inflammation, probably due to a disturbance in the absorption.

7. Permeability: By an unknown mechanism, which is probably physiological in nature, certain substances pass from the blood to the spinal fluid, while similar substances do not. We cannot state the permeability of the choroid plexus in health, but it does become more permeable in disease. The permeability and impermeability of various substances was noted.

8. Function: The most definite and demonstrable function is its mechanical—support and protection. Other possible functions suggested are nutrition, destruction of harmful substances, and distribution of the pituitary extract.

The chemistry may be thus summarized:

1. Protein: Albumin is present normally and increases under

pathological conditions; globulin is not present in detectable amounts normally, but increases in some diseases.

2. Sugar: A glucose is present, in slightly less concentration than present in the blood. This amount decreases with most of the meninges inflammations, increases in diabetes and possibly encephalitis, and remains unchanged in most other conditions.

3. Organic Index: Gives the amount of organic substances in the fluid.

4. Lactic Acid: Normally present only in traces.

5. Urea: Present only in traces normally, but increases with nephritis.

6. Cholesterol: May be absent normally, or in very slight traces.

7. Inorganic Constituents: Phosphates, chlorides, and carbon dioxide normally present, and under certain pathological conditions may vary.

8. Cytology: Normal fluid contains 3-6 lymphocytes per c.mm.; rarely any large lymphocytes, and no red cells. A lymphocytosis suggests a chronic condition and a polynuclear leucocytosis suggests an acute condition.

9. Colloidal Gold Reaction: Colloids have a certain protective action against the precipitation of gold suspensions by sodium chloride. Normal fluids do not affect the gold suspension, while certain pathological fluids cause a typical change in various dilutions.

10. The Wassermann Test: As applied on the spinal fluid, the principle is the same as when used on blood. Its significance has been noted.

11. Mastic and Benzoin Reactions: Reactions based on the principle of the colloidal gold reaction, using a solution of mastic or benzoin. Significance is the same as the Lange test.

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SOCIETY PROCEEDINGS

NEW YORK NEUROLOGICAL SOCIETY

THE FOUR HUNDRED AND THIRTEENTH REGULAR MEETING, MAY 6,
1924. DR. E. G. ZABRISKIE, PRESIDING.

The following program was carried out:

TECHNICAL PROBLEMS OF PSYCHOANALYSIS

Dr. C. P. Oberndorf: Interest in psychoanalysis is likely to increase or dwindle in proportion to the therapeutic results those using it can demonstrate. The differentiation of psychogenetic from organic conditions is one of the most vexing problems in medicine, and it must be emphasized that one must be as certain as possible that the patient's malady is preponderatingly functional. Psychoanalysis undertaken between manic-depressive attacks as a prophylaxis against recurrence appears theoretically reasonable, but proof of its efficacy must long be in doubt because of the normally intermittent course of this form of psychosis. Where a well-organized paranoid trend exists, the prospect of a cure by psychoanalysis is almost hopeless. Psychoanalysis, in contradistinction to hypnosis and persuasion, intentionally avoids specific determinate suggestion.

As a curative measure, psychoanalysis is most promising in cases of psychoneuroses in individuals between fifteen and thirty-five. Persons beyond forty years are not ordinarily the most favorable subjects. The patient should be in a position to devote four hours a week for four months or more to the procedure. A frank understanding of the nature and probable results of the treatment should be first made clear. A positive cure should never be offered, although an appreciable improvement may be confidently assured in many instances. Persuasion of the patient to undergo treatment is a technical error—he should be willing to come. Early resistance to revealing unsavory sexual experiences usually vanishes after treatment is begun and the patient realizes that his recital arouses no censure. Social association with the analyst during the course of the treatment contributes a retardative factor. One should also avoid contact with members of the patient's family. Family opposition to analysis forms an annoying source of antagonism, and is particularly baffling, as it lies beyond the control of the physician.

Suggestion, hypnosis, and reëducation can be used on patients who are not sufficiently intelligent, instead of analysis. So-called psychosynthesis should occur spontaneously, when resistances have been removed as a result of treatment. How much education should

be interspersed with psychoanalysis can only be determined after long experience and varies with each individual. There is no question that in some cases an analysis which does not penetrate the unconscious too profoundly may produce more satisfactory curative results. An analysis done over a longer period of time, for a year or more, may possess an advantage over the more intensively applied one, in that it allows the patient to become gradually acquainted with the new personality which emerges as a result of treatment. One patient remarked: "Psychoanalysis has brought me by devious pathways to the gates, and now I feel I cannot enter." In such a situation the resistances must be attacked again and again.

Very happy therapeutic results in sex abnormalities are at times obtained where the unconscious is barely touched. Many pathological impressions established in regard to sex can be molded at the age of puberty by reeducation without a very deep knowledge of the patient's unconscious. At times with all the essentials for analysis met, namely, insight, and a desire to be cured, satisfactory environmental and financial conditions, patients are not always cured by the procedure. Failure in such cases has been encountered in the hands of the most successful psychoanalysts. Many physicians attribute it to their own shortcomings, lack of patience, and mistakes in handling transferences. From a long experience of psychoanalysis, I can report that while results will not be successful in every instance, they have been more satisfactory than by previous methods of treatment of psychologic abnormalities.

ON THE SELECTION OF CASES SUITABLE FOR PSYCHOANALYSIS

Dr. Adolph Stern: Not all patients suffering from a neurosis are suitable to psychoanalytic therapy, as used by Freud and his followers. Those not thus amenable can be approached by other psychotherapeutic measures, such as suggestion, hypnosis, the "talking-over" method, the application of knowledge gained from psychoanalysis to environment of patient in an effort to make it easier for the latter to adjust.

The constitutional psychopathic inferior is not amenable to a strict psychoanalytic procedure, because of his basic egoistic and narcissistic trends; because of his inability to exhibit towards the love object the tender, respectful elements in love (the *zärtliche Liebe* of Freud); because of his inability to renounce egoistic motives, with consequent self-denial, in face of individual, family, or group demands; because of his not having been influenced to an appreciable extent by the repressive dams of shame, guilt, and a conscience; because of his lack of the concept, "ideal" in form of an object, or ego-ideal, on a sublimated level. These defects render him incapable of forming a transference on a high plane in the course of a psychoanalysis, and therefore ineligible to psychoanalytic therapy.

The next group comprise the "actual" neuroses of Freud, *viz.*,

anxiety and neurasthenia; and the hypochondriacs, which may be put into the narcissistic group. Others in this group present features of a psychotic nature, though strictly speaking they are not psychotic; some dementia precox cases do develop from this group in time. The symptoms these patients present are in the main of the nature of physical complaints; prominent among them being a myriad of gastrointestinal phenomena; endless in variety, intensity and distribution are the complaints of bodily aches and pains, and the paraesthesiae, not to omit the feelings of physical weakness of which these patients complain. The symptoms not infrequently come on when the individual is confronted with the heterosexual problem, especially marriage, the entrance into which in many precipitates the neurosis. These individuals show, upon investigation of their early history, some of the following characteristics: they are shy, very sensitive, are easily hurt, and tend to draw away from contact with people on slight provocation; they are not very accessible, and make few confidants; their circle of friends and acquaintances is small; interests are rather limited; they form "crushes" or strong attachments more readily with those of their own than with those of the opposite sex. These individuals, on account of their very limited capacity to "transfer," and their strong concern with themselves, do not make very good subjects for psychoanalytic therapy.

Frank cases of the psychoses, like paranoia, schizophrenia, and the manic-depressive group, including the cyclothymias, do not, as a rule, offer favorable material for psychoanalytic therapy; some authors have recently reported favorable results in the last mentioned class of cases, treated during the interval, or when the depression is not very acute; if acute, patients are inaccessible. The manic state is altogether an unfavorable time for instituting psychoanalytic treatment. Investigation into the ego impulses, the emotional aspect of these impulses, namely, narcissism, has made it possible to attempt something for these patients with the hope of freeing libidinous strivings from ego to object, thus giving the patient a greater capacity for object-love. Abraham, in his last contribution, "*Versuch einer Entwicklungsgeschichte der Libido auf Grund der Psychoanalyse seelischer Störungen*," has given us very valuable material in this connection.

The group of the "transference neuroses," so-called by Freud, including conversion hysteria, anxiety hysteria, and the compulsion neuroses, offers the most favorable field for psychoanalytic therapy, by virtue of the fact that patients belonging in this group manifest a libido activity in relation to objects (persons) and interests. Such individuals seek a disposal of their libido to objects, and when these for one reason or another are unsatisfactory, libido is withdrawn from the real object, not to the self or ego, but to the love-object re-created in phantasy, or the libido is converted into symptoms, which still show object-libido investment. A motility or pliability of libido is present in such individuals. [A case report was given by way of illustration.]

PSYCHOANALYSIS OF THE ORGANIC

Dr. Otto Rank, of Vienna (by invitation): Former unsatisfactory endeavors to bring the psychological into harmony with the organic were reviewed. The deepest Unconscious in us is the embryonal stage existing in us all. The physiologic mother-child relation remains the prototype for later libido gratification, the embryonal stage being the only stage where the psychical and the physical are united. The Individual is actually in the position to restore the Foetal situation. Hindrance to this lies in the conclusive fact described by me as the "Trauma of Birth," the importance of which consists in the interference with the pleasurable intra-uterine state and in the repression of this memory. Thus it becomes the physiological nucleus of the Unconscious. As a guard against the Libido tendency to regress, the anxiety experienced at parturition is psychically firmly established. This concept of the psycho-biologic importance of the Birth Trauma allows us to base biologically the psychical meaning of the physical symptoms.

Physical symptoms of hysteria represent traumatic details of parturition. Paralysis represents the immobile stage of the intra-uterine state, and the anxiety at freeing from it. Disturbances of breathing are reproductions of the danger of being choked in parturition. Major hysterical attack, well known in the attitude of the *Arc de Cercle*, is a defense against the coitus position, but is also the reverse of the foetal position: thus it is a defense against the tendency to give birth, as well as to be born, expressed in organic language.

As symptoms originate from the psychical and physical, so they may be therapeutically influenced from both sides.

Discussion

Dr. A. A. Brill: The rules which were originally formulated by Freud in regard to the selection of cases still hold good, but it is very difficult to gain the real impression about what an author wishes to convey merely through the reading of his works. When I first started to practice psychoanalysis, one of my first patients was a woman over fifty. She impressed me as a good case for psychoanalysis, and I went ahead with the analysis and cured her. Later, when I saw Professor Freud I told him I had analyzed successfully a woman of over fifty, and he remarked that one should not take his words too dogmatically, that one must use his judgment. Some people are very old when they are thirty; others are young when they are sixty. I always select my cases on the basis of the patient's mental reaction. If he reacts properly to the treatment I proceed with the analysis. I treat not only psychoneurotics, but of late years I have analyzed a number of narcissistic neuroses. The narcissistic neuroses, such as the paranoid types, cannot be cured or even treated in the same way as one treats transference neuroses, but to my great surprise I found long ago that they can be helped by analysis. I am convinced that I have kept a number of paranoid patients out of asylums. I could cite a number of such cases who are doing very

well in their own homes, and very few people realize that they are insane. Formerly I insisted that such patients should be sent to hospitals for the insane, where they invariably remained for the rest of their existence. Thus, a paranoid case diagnosed eight years ago whose family refused to send her to an asylum, is at home and earning \$35 a week in an advertising office. She has delusions, which at times are very active, but so far she has maintained herself very well. Although one cannot use psychoanalysis in such cases in the generally prescribed form, one can sometimes keep patients from merging into the familiar asylum type. The manic-depressive types have been mentioned by Dr. Stern. I have treated over 300 manic-depressive cases since 1908. I would consider about 40 per cent of them either cured or markedly improved. One patient, a woman of thirty-six who had had attacks of depression every year since the age of eleven, and was well known to most neurologists and psychiatrists in New York, finally consulted Kraepelin, who told her that she was suffering from the depressive type of manic-depressive insanity and that nothing could be done. He recommended that she should remain in bed and take some medicine. She then heard of Freud, who referred her to me. I treated her continuously for about nine months and she has not had an attack for over ten years. I consider that case cured. These patients cannot be treated like psychoneurotics; the technique must be changed to suit the case. They cannot be treated when they are very depressed; I think that the best time to treat them is during the lucid intervals. As we keep on working we learn more and more about the different types of patients coming to us, and our technique must be varied accordingly. As a matter of fact, psychoanalysis as it appeared at first was quite different from the analytic therapy of to-day. The more we worked with it, the more we learned about the nature of the neuroses. I agree with Dr. Oberndorf that psychoanalysis is not suitable as a cure for all things. No one has ever claimed so much for it. As a matter of fact, Freud has always said that it is very limited as far as its therapeutic application is concerned, but as far as gaining an insight into the condition of the patient, there is nothing in neurology and psychiatry that can be of greater help. In psychiatry it has already shown good results, as seen by the works of Bleuler and others.

Dr. Rank's very instructive statements may sound very strange to those who have not occupied themselves with psychoanalytic work; they may feel skeptical about the influence of the birth trauma, but after all, why should we feel that a being, born with all his faculties, who has been living before he was born for quite a number of months, should not be influenced by impressions received *in utero* and during the act of birth? I feel that not only are these impressions retained, but, with Dr. Rank and others, I maintain that they play a very important rôle in the general make-up of the person as well as in his neurosis. Thus, I can mention the case of a man who for years complained of extreme fatigue. He was also a sleepwalker, and I had a night attendant stay with him and watch him. The attendant

reported to me that he always slept in a very cramped attitude; his upper and lower extremities were markedly flexed and drawn up close to his chest. The attendant thought that this might account for his fatigue. It occurred to me that the position he assumed in his sleep was the attitude of the fetus in the uterus. As a matter of fact, most people have a tendency to assume that attitude while sleeping, undoubtedly a remnant of an intra-uterine habit. This patient showed any number of so-called womb phantasies. Thus he always clamored for quiet country places; he could not stand the noise of the city and forever ran away from the city to the country, and then back to the city because he was bored by quietude. It was a constant fight between the desire for his mother and the wish to be detached from her. This man undoubtedly represented a type which Dr. Rank had in mind when he read his paper. I have now a patient who tells me that the greatest pleasure he can imagine is to be placed in the position of a person who is awakened on a winter morning when it is cold, and be in a nice warm bed and continue to sleep. This man is always trying to return to the primary fetal situation. He is also weaving all sorts of suicide phantasies which also show a hankering for the mother earth, where he thinks he will find peace and quietude. Another patient dominated by similar fancies actually spends most of his time in Turkish baths, where he feels calm and peaceful. He told me that some doctors have done him a lot of good by ordering for him hydrotherapy. We find the same expressions in dreams and in symptoms, and there is no doubt that they reflect either the blissful state of the womb period or the anxiety of birth. Dr. Rank, who has investigated these particular mechanisms deeper than other observers, has rendered us a great service by his excellent presentation.

Dr. T. H. Ames: Some explorer years ago made the comment that if one should travel through foreign countries, and stay long enough, one would understand their customs. To some of the people here who are not psychoanalysts, I would suggest that if they go to the land of the psychoanalyst, and stay long enough, they may understand. Dr. Rank may have gone over the heads of a good many people, even of some of the psychoanalysts. There is enough material in some of his sentences for us to think of for a long time. Yet, after all, the idea to return to the uterus is not quite new. One gets the same idea from the Bible, and the thought of being born again might be included in this idea, and certainly the pleasure of the warm baths which Dr. Brill spoke of is a bit analogous to the warmth that the baby must feel. Some ten years ago, at the Neurological Institute, Dr. Baehr used to advise his sleepless patients to get into the fetal position, telling them that they would sleep better that way. Dr. Rank's ideas are not so fully explained in his paper, of course, as in his "Trauma of Birth," which he probably will read later on; but I think there is sufficient in his paper to warrant those who do not understand it at the present time to have patience, and look for convincing arguments in their favor later on as corroboration comes.

Dr. L. Pierce Clark: The general outline of the importance of

the birth trauma, by Dr. Rank, has much to recommend it for a continued investigation of the ego neuroses. As studies in this direction are advanced the general conception will not seem so fantastic as it often appears at present. I think we forget that psychoanalysis is not a science in the strict meaning of that term. Certainly not as academic psychology is considered at present, because it deals almost exclusively with subjective data. Both objective and subjective data, however, are a part of the whole life process and, therefore, worthy of our earnest attention, though it may not be subjected to exact experimental reproduction. Psychoanalysis must probably always remain an art.

As regards psychoanalysis of manic-depressive psychosis, principally the depressive phase: I have reported upon my personal material, carefully worked out over a period of years, at different times. My general conclusions in regard to the matter are as optimistic as previously reported, and I believe that psychoanalysis cannot do a better work in the future than advancing analyses of mild type of cyclothymics, thus reducing recidivation of these individuals who now occupy hospital room and attention in public and private care. Certainly my work has been most encouraging in the final outcome of these cases, not alone in preventing the recurrent attacks, but in readjusting these individuals completely to their life and activities. The unfortunate thing at the present time is that it takes a very long time to analyze cyclothymics. The best period for analysis is not in the interval periods between attacks when the cyclothymic is seemingly quite intact, but when he is just entering or recovering from the depressive periods. But little can be done with the manic types or with the manic phases. It is largely in the form of prolonged and continued depression that we can do most. In my work with tics, which I have reported extensively before this society, I would say that the final outcome in these cases has been most satisfactory. In spite of the fact that there is a back-swing to the mid-brain conception of the origin of the tics, I am quite certain that there is a very large group of tics purely psychogenic and that they can be psychoanalyzed.

From an investigative point of view the methods of analyzing transference neuroses have been very nearly completed, but it is upon the ego neuroses which I believe the greatest study and investigation of the future will be called for. One of the great difficulties has been that we have used the methods in handling transference neuroses directly over into study of ego neuroses, instead of building up a new manner of approach on the basis of origin and evolution. One of the great factors to be borne in mind is that the counter transference on the part of the analyst must be even more carefully worked out than in the transference neuroses. In view of the fact that these narcissistic neuroses greatly outnumber the hysteric anxiety neuroses and the like, it behooves us to make every effort toward solving this important problem, both for neurology and internal medicine. The habit has grown with many analysts of late to refer to psychonotic failures as due to the narcissism of the patient, whereas in many

instances they are ordinary types of resistance and do not properly belong to narcissism at all. I am glad to see that there is a definite trend frequently emphasized in the past by Freud that the use of symbolism in dreams and methods of analysis of dreams should be used to investigate more fully the infantile unconscious. I do not believe this trend in the methods can be overemphasized. Even a few cases thoroughly and completely analyzed in this respect throw a flood of light upon the necessity of our reaching this part of the unconscious life if we are to relieve our patients of many of the neurotic symptoms. I would finally add that in spite of the fact that psychoanalysis may never be considered a science such as that of neurology, internal medicine, or academic psychology, it is nevertheless a steadily growing art which at present lies possibly nearer to the essential foundations of life than any other branch of medicine.

Dr. Smith Ely Jelliffe: As I look about and see so many new young faces and so few of the "Old Guard" here, I am inclined to say that it is a distinct matter of felicitation to this Society to find the room so packed and people standing up. This has not happened for many a year. I am reminded of some of the prophetic utterances of the nonpresent "Old Guard" of fifteen years ago, who told us with much real conviction that in five years this fad about psychoanalysis would blow over. Later the prophecy was extended to ten years, and frequently reiterated, and it is still being reiterated that we who are interested in this aspect of medicine are simply engaged in a fatuous faddism. The presence of our distinguished foreign visitor no doubt has brought many of us here, and I have a certain narcissistic satisfaction in stating that it gave me pleasure to translate his "Myth of the Birth of the Hero" to make it available for English readers. It was convincing to some of the "Old Guard": Dr. Pearce Bailey, remembering his own boyhood fantasies of being an "outcast" child, when he read the "Myth of the Birth of the Hero," said he received the first light he had really ever had upon the significance of the parental complex. I shall only add that I recall with pleasure Dr. J. J. Putnam's remark that he once made to me, that "He enjoyed my adventurous thinking"; and so, in the further pushing forward of such adventurous thinking, I should like to repeat an observation which I have already made before this Society, and which is, I believe, pertinent to Dr. Rank's paper concerning ontogenetic impressions which may have been received during intrauterine life. This observation was received with the same amount of amusement at the American Neurological Association meeting, held in Boston, that it received a number of years previously when I spoke of it in this Society. Dr. Rank has emphasized not only the trauma of birth, but the significance of intrauterine impressions. I should like to recall an interesting experience at a discussion I once took part in where I ventured to say that it was not impossible that Irving Berlin's "jazz music" may have originated from intrauterine impressions arising from an irregular heart-beat rhythm of his mother. I was very much amused and interested during the discussion, when one of the physicians in the audience rose and said that he had been

the physician of Irving Berlin's mother, and that she did have a chronic cardiac lesion, with a very irregular beat, and died of her heart disease.

Dr. E. J. Kempf: In discussing the papers, especially Dr. Rank's contribution, I find myself inclined to present similar material with a different nomenclature. In speaking of the early infantile state of living, it is sometimes called the unconscious which never becomes conscious in the adult, and is shown in the inclinations of the adult neurotic to regress to a state of living which is satisfactory to the infant, and even back to an earlier stage; and disinterestedness in responsibility, lying in the warm bath, and by curling up in bed in a fetal position. I would like to have the Society consider the subject in the light of conditioned reflexes and autonomic segmental cravings. We have the fetus in the most important part of its biological existence in the warm bath in the uterus, and we would expect the whole nervous apparatus thus existing to be thoroughly conditioned by these stimuli. You will find it true probably that at least one very important avenue of approach from the mother's condition to the condition of the fetus will be the circulatory system. We know from the work of Cannon and others that where we have any form of fear, using the word fear in a very broad sense to cover the resistance to reality, we have a disturbance of the circulatory function, with marked changes in the blood pressure, pulse rate, and constitution of the blood itself. So if we have such a fear, hate, or jealous condition in the mother, we might expect a certain amount of disturbance of circulatory function, which in turn would disturb the circulatory function of the fetus, because of the nutritional disturbance. This in turn would be anticipated as the cause of fearful metabolic and neurone disturbances in the fetus.

In working out some theories about the autonomic segmental cravings, we found in every instance that it compels the individual to strive to bring about a change in the environmental situation, and this change has to come within a certain type which as a counter stimulus neutralizes strain and which allows the autonomic segment to swing back to its norm. I think that law underlies all human behavior. The adult in his conception of heaven largely produces a situation in fantasy of the after-life which is analogous, so far as the reflex relaxations are concerned, to the fetal state. We also find this in sleep. When an individual is distressed by some sort of situation that keeps the cardiorespiratory apparatus speeded up, he has a very restless sleep. We do the same thing in the universal psychoneurosis, fear of degeneration, that compels us all to work. We are constantly striving to bring about situations which give us a return from the outer situation; in giving us the return inward we are able to relax. In analyzing patients, especially the egoistic type, I find that whenever the individual makes a projection of interest outward he comes to a certain point where he experiences serious pain. With a little urging he localizes it about the cardiac area. I find in different types of mechanisms that the localization is mainly at the apex, and at other times at the upper part of the cardiac area.

This pain is very quick and disturbing; it usually does not endure very long because the patient is compelled to swing back to a narcissistic fantasy system, and in that he again becomes a beautiful individual who is not likely to fail because of his deficiencies, but because of mistreatment, and so forth. When the jilted lover refuses to form the narcissistic fantasy he suffers severely from cardiac tensions. In analyzing these cases and carrying them back to the early stages of childhood, we come to this problem. At birth we find that the infant is completely dependent on receiving nourishment, and life depends upon being helped. In the weaning period the efforts of the parents to wean this infant usually are unintelligently adapted to bring about a diversion of cardiorespiratory function, so that the cardiorespiratory function will reflexly support behavior that is adapted to help itself. Where we find the infant has failed to make the cardiorespiratory conversion, we will have an individual with a tendency to regress to the early infantile stage, or even further back into the fetal stage, in the face of hard realities. This reflex compensation is a very important function, which you can see is a physiological-behavioristic problem; to train the cardiorespiratory function so that it will support the individual in his life crises. We know in athletes and in men who make notable efforts to conquer great obstacles that their power to stand up in the struggle depends almost entirely on the circulatory-respiratory system. The heart must react with courageous tensions to increase the blood stream, so that the individual will be able to stand up under any assault. When the cardiorespiratory function does not expand, we find the individual compelled to shrink from the attack, and he falls back into the neurotic or infantile fantasia system. In the graver, more pernicious, dissociated regressions he even develops a circulatory-respiratory adaptation that is surprisingly like a fetal circulation, namely, a crumpled-up thorax, shallow respiration, small rapid pulse, and an increased carbon dioxide coefficient, as has been pointed out by many psychiatrists.

Dr. Monroe A. Meyer (by invitation): I had the experience of undergoing psychoanalysis in Vienna. I won't tire you with any discussion of my analysis, but can state that in my own instance the birth trauma played a significant part. It was responsible for at least one important phantasy which had a tendency to repeat itself constantly. I have heard others who were thoroughly analyzed report similar results, and have seen them in patients.

As regards the relation of the mental to the organic, a book, "*Das Buch vom Es*," by Groddeck, has recently appeared in which a number of instances of the psychic basis of organic symptomatology are cited. While this book is written in a form suitable for the layman, I believe that every general practitioner, certainly every organic neurologist, could read this book with profit. Groddeck has produced striking results in handling analytically cases in which a chronic organic symptomatology was due to underlying psychic mechanisms.

Dr. Albert Polon (by invitation): I will restrict my remarks to

Dr. Rank's paper, entitled "Psychoanalysis and the Organic." The theoretic position he has taken, novel as it may seem, is based upon experiences which obtrude themselves daily upon the general practitioner, specialist, and psychoanalyst alike, and which substantiate Dr. Rank's formulation. Every practitioner knows how important it is to reckon with the psychologic factor in the treatment of organic disease. One or two striking examples which occurred recently in my practice illustrate this point.

Within the last few days I saw a woman, also seen by Dr. Casamajor, who for several years showed signs of moderate rigidity as part of an on-coming Parkinsonian syndrome. Some four months ago she was treated a bit brusquely, for diagnostic purposes (lumbar puncture, etc.). She was badly frightened by it and within twenty-four hours manifested a violent P. A. tremor. So much for the contribution of fright to the release of an organic symptom. Now this tremor is beyond any question organic, and yet it is remarkable how much of the psychologic there is in it, so much so that under suggestion it can be made to vanish; the tremor as well as the rigidity. Another example: During some of my work in Vienna I had occasion to observe the use of typhoid vaccine in the course of febrile post-encephalitic cases. With the permission of my chief, Dr. Casamajor, I tried typhoid vaccine on eighteen cases at the Vanderbilt clinic; fourteen of these have shown remarkable improvement, two of them to an astonishing degree. The mask-like facies largely receded, the gait changed, the drooling disappeared—thus consistently in all the improved cases most of them returned to their former occupations or were able to carry on their work at the time more efficiently. On repeated consideration of these results, we were not able to account for any factor, except the psychological one. We had no sense of conviction that the typhoid vaccine worked. We could not see why it should have been more efficient than glucose injections, or why the particular quantity of 15 m. should have had any efficacy. If there are any biologic reasons for the changes induced they are unknown to us. But one thing we feel sure of: that in the psychological situation created by the treatment we have had a significant instrumentality capable of markedly affecting organic symptoms. Plain water as a control was not tried, but I have the feeling that it would have accomplished just as much. In short, wherever there is an organic situation it also includes a psychological factor, which is quite important in the therapeutic handling of the case.

Now, Dr. Rank's paper calls attention to this convergence of the psychic and the organic. Our former classification of the symptom as being purely psychic or purely organic, a relic of the metaphysical doctrine of psychophysical parallelism, is quite arbitrary, and most likely incorrect. In most cases, if not in all, there is convergence of the somatic and the psychic to a common point of fusion, to a point where they are inseparable. Now in no place do we find this fusion so well represented as it is in the intrauterine state, especially at the time of birth. The purely vegetative intrauterine

existence of the fetus is suddenly changed through birth into one in which a new orientation is added, namely, that of the psyche. It is the moment where phylogeny surrenders its sway in a large measure to ontogeny. This is the ideal point of fusion of the two phases of the human personality. From now on it shall be never again either wholly organic nor wholly psychic.

There is one other feature in Dr. Rank's contribution to be commented on. It is a consistent observation in man as well as in other animals that their behavior in response to a stimulus is carried out in accordance with a previous pattern. Every experience from a certain point of view is a trauma. We respond to later-day traumata with patterns of behavior which were induced by previous injuries. We recoil to the past in all experiences, but especially in those which provoke disease. Now the most significant of all traumata in one's life, it can be readily agreed on, and also the one having priority, is the separation of the individual from his mother. When in later life traumata occur the reaction must and does reproduce earlier patterns of response. And what is of interest is that the severer the injury the more primitive is the level to which the response descends. This applies alike to the organic as well as to the psychic, to the mild as well as to the severe injury, the severity of the trauma determining the level of regression. It is in this sense, I believe, that in the trauma of birth we have a valuable criterion of a primal injury which draws a most fundamental pattern of behavior to which man recoils in organic as well as in psychic disease. It is the point of departure of the psychologic from the purely organic, but it is also the point to which the two converge in disease.

Dr. Gregory Stragnell: I was particularly interested in Dr. Rank's paper this evening. It may seem peculiar, but a person who is a nonanalyst frequently forgets that the most severe critic of the analyst is the analyst himself, or he should be. I think Dr. Rank's statements are somewhat sweeping, somewhat broad, somewhat valid, and somewhat invalid. I think it is always dangerous to classify and reduce things to any one point. However, he comes back to the original classification of reducing all things to the original birth trauma. That part we will call valid, just the same as we reduce all human activities to a narcissistic basis, but to leave them there puts them on a static basis. We know in tracing the psychosexual development of man we find the narcissistic level with homosexual and heterosexual strata. We may consider birth trauma from much the same point of view. I agree that the weaning process of the child from the mother is one of the most serious traumatic experiences. There are, however, other weaning processes beside that of the birth trauma. There is the actual weaning process, and in a series of cases I have just finished studying I have tried to plan out a classification roughly which takes in birth trauma with its nutritional level first, and then make another classification of the actual weaning. There are levels here, just as you find the narcissistic human with sexual and heterosexual levels, you find levels of regression. You may say if you wish that everybody goes back to the

intrauterine period, but if you attempt to classify everything down to that level without leaving a broad scope of view you forget that there are others whose main purpose in life is to go back to the nutritional or breast level, which is just as important, and there are still others who are striving to attain other levels, such as the diaper level. We find in certain cases of paralysis that it is valid enough to try to go back into the intrauterine state, but there are other cases which have other goals in view, for instance, which have the goal in view of rendering the person dependent, so as to effect a nutritional leaning relationship to the parent, either male or female. The same thing might be said of a paralysis where other goals are established. I will cite one case which will fit into a sort of intermediary stage between the intrauterine and breast levels, and that is the case of a man in whom there developed during the course of his sickness a paralysis of the right arm. In the history of his case I found that he, as a boy, had accidentally discharged a pistol and had injured the right arm. The result was that his mother, who was in another city, immediately returned when she heard her son had injured his hand. It happened that when the patient's paralysis developed in his hand the man's wife was in another city, and she was immediately summoned to come back to him. The wife was playing a very definite mother rôle. Interesting enough, in the course of the history I found that the patient knew of a boy who worked in the patient's office who had fallen down a flight of stairs, and they had to send for the boy's mother, who was in Europe. It is always important to find the goal. We frequently find it a desire to return to the intrauterine life, and then again we find that it goes down to various levels, and always for some unconscious motive. There is one other point, and that is to consider the nutritional phase, and how it binds itself up in the love-life of the patient. In intrauterine life, from which the child is weaned at birth, I should say that the conditioned reflexes had a great deal to do with the growth and nutrition of that infant. The same thing holds good with the weaning from the breast, and I think we will do well not to try to separate the nutritional cravings from the sexual cravings of that period, but to consider them in their respective relationship to each other.

Dr. Oberndorf: We have heard a good deal about tracing the origin of symptoms back to periods before the fourth year, and the importance of the trauma of birth. I have analyzed cases where conscious fancies existed of a wish to return to the mother's womb. Dr. Jelliffe has referred to Irving Berlin, and I am tempted to quote the cartoons of Mr. Goldberg: "after you get it, what are you going to do with it?" The problem is what the patient is going to do about it after the trauma of birth or other unconscious influences have been brought to consciousness. One may reveal to a patient that symptoms represent an unconscious yearning for a prenatal state, and that will not help him. While theoretically it may be so, that in the illness he is seeking to return to a life of the earliest periods of life, the physicians and patient are up against the crux of the analytical problem, namely, overcoming resistances, so that the

patient is able to cope with his personal situations which have occasioned the regressive tendencies in the light of analytic revelations.

Dr. Stern: I would like to say a few words regarding the analysis of manic depressives. I have attempted analysis in only a few cases, about eight in number. From my own experience I cannot speak with great enthusiasm, if one has in mind a cure; a cure that is based, not upon the fact alone that the symptoms have not recurred in so many years, but upon the knowledge that the analysis has been of benefit to the patient in rendering him more capable of object-love than he was before the analysis was undertaken. I have in mind two patients who suffered, one from a mild depression that had recurred several times before I saw him, and another who had for about eight years before coming for treatment suffered from a cyclothemia. In both patients I feel that, in spite of the fact that no permanent disappearance of the symptoms has so far been brought about, a definite improvement has resulted in that in both patients, when depressed, a total rejection of the object has not taken place, as heretofore; some of the narcissistic libido has been made available for object investment. One must guard against speaking of a cure in these patients if a disappearance of symptoms takes place while the patient is under treatment. We know that spontaneous cure is the rule, with a likelihood of recurrence. Unless the analyst has some objective evidence, in increased ability of the patient in bringing about and maintaining more satisfactory libidinous object investment, he should not speak of a cure in cases of manic depressives.

Dr. Rank: I only want to say that it is pleasant for me to get into direct contact with men I have known only through the literature, and so I was more interested in getting impressions of their personalities than in listening to their arguments. But I am very glad to admit that I can agree with most of their points of view, which rather bear out my statements from other sides. I even agree with the criticism, as, for example, that brought forward by Dr. Stragnell, who, I think, would be pleased, if he will read my book, to see the importance I laid on the other individual traumata he mentioned, as, for instance, the weaning trauma, and others. Here I only wanted to point out the importance of the trauma of birth, which has not been previously realized and emphasized.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

REGULAR MEETING, APRIL 17, 1924, C. M. CAMPBELL, PRESIDENT,
IN THE CHAIR

INHERITANCE OF MENTAL DISEASES

DR. ABRAHAM MYERSON (Boston)

The term insanity as well as the term feeble-mindedness and all terms which imply that there is necessarily a unitary character to psychiatry are more than useless—they are pernicious in that they exercise an influence upon the mind which vitiates most of the work that has been done on the inheritance of mental diseases. There are independent groups of mental diseases which will be declared to have no hereditary value and others to run in families, as the phrase goes. That this “run in families” is necessarily hereditary, to be compared with Mendelian heredity or the transmission of the major biological qualities, seems to me *not* to be the case. The working hypothesis that wherever mental diseases appear to run in family groups, some factor is at work which has been introduced from the environment and which has injured the germ plasm, is here advanced. This theory has been called blastophoria by August Forel so that we may speak of this working hypothesis as the blastophoric concept.

There is no unity in feeble-mindedness; the problem of the cretin belongs to the problem of endocrinology; the problem of the congenital syphilitic is the problem of syphilis; the problem of spastic diplegia and other spastic states, so often associated with idiocy, is a problem of trauma at birth, infectious disease, and the like. Occasionally it represents a failure in development, and there it is part of the problem of teratology and has no especial relationship to other types of feeble-mindedness.

The conditions above mentioned rarely have anything at all to do with heredity, or at least this may be stated—that there is no obvious connection with defect or disease in an ancestor. They tend to be sporadic, to occur in families which can by no manner of means be differentiated from the ordinary groups in the community.

There also occur, especially among the more marked defects, the idiots, cases in which nothing whatever can be found which in any way adequately explains the occurrence of the defect. As one studies the cases of marked defect one is struck with the large number in which this represents a variation from the family level and without any hereditary background. I have as yet had no definite research experience with the higher grades of feeble-mindedness, the moron type, which constitutes probably the largest group of the feeble-minded. The data upon which these are declared to be hereditary in origin, which appear in the textbooks and in the special writings of Goddard and Davenport, seem to me to be extremely faulty. Espe-

cially is there to be criticized as unscientific such family studies as "the Kallikaks" where a field worker on the basis of hypothesis, guess, and intuition declares the dead and the quick feeble-minded without the slightest definite reason for so doing. Making a diagnosis of morosity is a clinical matter attended with difficulties, but the field workers of Doctors Goddard and Davenport have no difficulty in doing this on the basis of a court record, of a tradition, and of a cursory glance. That there are groups of the feeble-minded in which the disease runs in families over one or more generations seems to be without doubt. How large a proportion this constitutes cannot be at present stated. It is unquestionably much smaller than has hitherto been assumed, and even in the cases where it exists is not necessarily a fixed character persisting from generation to generation. It is interesting to note that the families founded by definitely known feeble-minded persons discharged from Dr. W. E. Fernald's institution have not shown the inevitability of feeble-mindedness in their descendants nor any trace of the much-discussed prolificity which appears so conspicuously as a bogymen in the semi-scientific and lay literature.

The situation in the psychoses. There is no evidence to show that general paresis depends upon any hereditary factor whatever. There is no evidence that the arteriosclerotic psychoses depend upon anything but the appearance of arteriosclerosis in the brain, which seems to have the same background as arteriosclerosis in general; namely, infectious disease, bad habits of living, alcohol, tobacco, excessive diet, and the stress and strain of life in general. There are occasionally cases where cerebral arteriosclerosis occurs in members of the same family and where an arteriosclerotic ancestor has descendants who show mental disease. These are mere coincidences, for it can be shown, and has been shown by Koller, Diem, Jolly, and others that cerebral arteriosclerosis occurs more frequently in the ancestors and collaterals of the "sane" than the "insane." There is no scientific evidence showing that alcoholic mental disease is an hereditary matter. Many of those who become alcoholic are peculiar but the main basis of the alcoholic mental disease is alcohol operating in a curious manner upon an individual. This idiosyncrasy to alcohol is a pharmacological matter, to be compared to the reaction to bromides or morphine seen in certain individuals. It has no distinct relation to psychopathy except that psychopathic individuals often drink to excess just as other psychopathic individuals cannot stand alcohol at all. The study by Elderton, Pearson, and others is interesting in relationship to this matter.

The above three groups account for about 40 to 50 per cent of all cases admitted to insane hospitals and there is therefore at least that percentage in which no evidence of any valid kind has been brought forth to show the working of any force which can be compared to heredity. I come to a group of mental diseases which by all accounts and from all the literature appears in family groups; sometimes in several generations and sometimes in several members of the same generation.

Before taking up the situation in dementia precox, manic-depressive psychosis, and the involution diseases, a few statements in regard to certain data collected from the literature and especially from the work done by Mott in London and by myself in the Taunton State Hospital will be of interest. First: over 10 per cent of the inmates of the state hospital at Taunton are related to one another in a close way. The largest group of those related to one another are the brother-sister groups. The other groups follow in this order: sister-sister groups; brother-brother groups; mother-daughter groups; mother-son groups; father-daughter groups; father-son groups; aunt-descendant groups; uncle-descendant groups; cousin groups. Throughout the literature it appears that there are more females in the family groups with mental disease than there are males, and that in so far as it can be discovered by the figures the female transmits mental disease more frequently than does the male. This fact, however, can be explained by certain facts which are conspicuous in the Taunton cases. The female insane have a much higher marriage rate than the male insane, especially in the dementia precox group; the marriage rate of the general paretics and the senile dementias being about equal to the normal marriage rate; the marriage rate of the male dementia precox patient is extremely low, whereas the marriage rate of the female dementia precox patient is surprisingly higher than that of the male, yet distinctly less than that of the average female. Because the female in the group in which mental disease tends to occur marries more nearly in accordance with the normal marriage rate than does the male, she is more liable to have descendants and thus more liable to transmit mental disease. Again, the male of a family is much more apt to wander away from the district in which he was born than the female and thus to appear as a sporadic case in the statistics of some other institution. These facts are social rather than biological in their nature and there is no conclusive evidence that the female is more liable to transmit mental disease than the male.

It also appears from the data gathered all over the world that the descendant (in family mental disease) is apt to have the mental disease at an earlier stage than does his ancestor and in a worse form. This phenomenon is called anticipation and has been greatly stressed by Mott and others. While it is true that there does appear to be some basis for the opinion that there is this tendency, it also appears that the way the statistics have been gathered explains a part of the situation.

A survey of the world literature reveals only one case in which mental disease is actually known to have persisted for four generations, and that is in the case reported by myself. There are very few cases compared to the total bulk of mental diseases in which the mental disease occurs for three generations. Most of these also have been recorded amongst the Taunton cases. It appears probable that mental disease does not occur very frequently for more than two generations. Oddities and peculiarities may persist but difficulty in evaluating these or in tracing them makes it impossible to give them any great scientific value.

(a) If dementia precox occurs in an ancestor and if his descendant has a mental disease that mental disease is most likely to be dementia precox. This opinion is based on a survey of the literature and of my personal studies. Occasionally other mental diseases will occur in the descendant but in so scattering an instance as to be unimportant. It is quite noteworthy that there is a distinct tendency for the disease to manifest itself in a more serious form in the descendant and in greater liability to early dementia. (b) If manic-depressive psychosis occurs in an ancestor, the "insane" descendants seem to group themselves in two classes: the larger group which tends to be manic-depressive, and the smaller which tends to be dementia precox. Most of the authors concur in this statement although some state that dementia precox is rare in such descendants. It may be stated that typical cases of manic-depressive in an ancestor are followed by manic-depressive in the descendant. It is the atypical cases, those in which there is some doubt as to the diagnosis, which are followed by dementia precox in the descendant. (c) Involution psychosis in an ancestor, if followed by mental disease in a descendant, is usually succeeded by dementia precox. There is a surprising unanimity of experience and opinion on this point. (d) If there is paranoic mental disease in an ancestor and the descendant has mental disease, he is liable to have either paranoic mental disease or dementia precox. It will thus be noted that in these cases there is some tendency for the psychoses to be dissimilar in clinical type and for the psychoses to tend towards dementia precox in the descendant.

The psychoses of brothers and sisters. The psychoses of brothers and sisters tend to be alike. Dementia precox in a family group of siblings is apt to be uniform in its manifestations although one classical case has been reported and personally observed where there was a remarkable transition in type from what appeared to be pure paranoia to hebephrenic dementia precox in five sisters. Where manic-depressive occurs in a sibling group the manifestations are closely alike. It sometimes appears that one sibling becomes insane at the involution period while another becomes insane early in life. Nevertheless, although one will be called involution disease and the other perhaps dementia precox, a close study will reveal the fact that the two psychoses are fundamentally the same. There are a few cases recorded in which manic-depressive psychosis and dementia precox occur in the same sibling group. On studying them I have not been able to convince myself that typical cases of manic-depressive and dementia precox occur in the same sibling group. It is, however, stated by some authors that this is possible and does occur. If so, it is, relatively speaking, rare.

Normal and abnormal heredity. Extensive studies made by Koller, Diem, and Jolly indicate that in so far as certain characters which have usually been given a great deal of weight by earlier psychiatrists and by some psychiatrists still publishing, are of no fundamental importance in determining psychopathic heredity. For example, it appears from the work of these three authors that neurasthenia and psychoneurosis, generally speaking, occur as fre-

quently in the ancestry of the so-called normal as in the ancestry of the abnormal. It also appears that organic brain diseases are if anything more common in the ancestry of the normal than in the ancestry of the abnormal. This is especially true of cerebral arteriosclerosis, hemiplegia, apoplexy, and the like, which are often given great weight in the literature. It seems to be true that certain types of alcoholism occur somewhat more frequently in the ancestry of the abnormal than in the ancestry of the normal but not to a striking degree. Mental disease in an uncle or an aunt appears as frequently in the history of the normal as in the history of the abnormal. Mental disease in a father, mother, grandmother, or grandfather occurs very much more frequently in the ancestry of the abnormal than in the ancestry of the normal. Such things as cancer, tuberculosis, diabetes, and the like, do not seem to me on a survey of the literature to have any psychopathic bearing whatsoever. It is true that tuberculosis occurs quite frequently in the history of the ancestors of the feeble-minded of the institution type, but this is because the social stratum from which these people come have a good deal of tuberculosis. At Dr. Fernald's institution in Waverley there is less tuberculosis than in the general community and this largely because of the good hygiene of the institution. Therefore, a good deal of what has passed as psychopathic heredity, namely, nervousness, tuberculosis, diabetes, organic nervous disorders, and to a limited extent, alcoholism, has absolutely no psychopathic bearing. This is also true of a good deal of mental disease itself. The fact that an ancestor has had senile dementia or arteriosclerotic psychosis has no bearing, so far as can be discovered, on the dementia precox, feeble-mindedness, or other psychotic manifestations in a descendant.

A consideration of certain theories of heredity. Polymorphism, a classical theory sponsored by Esquerol Morel, and developed by Lombroso and a host of other writers, down to our own times, postulates the following: That all forms of mental aberration from eccentricity of character to cretinism, and including all of the psychoses, all of the neuroses, epilepsy, migraine, headache in general, alcoholism, crime, prostitution, vagabondage, cachexia, pallor, genius, sex perversion, and every departure from a hypothetical normal, are manifestations of one thing—the psychopathic constitution; that the disease condition manifests itself in a slight form in one generation and then increases degree by degree until when a fourth generation is reached, the stage of idiocy appears and the stock then disappears. This remarkable theory which still shows its effects in all the writings on the subject must be evaluated according to the time in which it originated. At that time there was no knowledge of reflexes; the germ of tuberculosis had not been discovered; in fact, bacteriology was just commencing to appear. Nothing at all had been done on internal secretions. The cause of general paresis and tabes as due to syphilis was not even suspected and these diseases were later and gradually dug out of diffuse masses of mental and nervous diseases by brilliant clinicians. Rickets, anemia, tuberculosis, and many other things were lumped under the heading scrofula. Tuberculosis was

believed to be distinctly hereditary and in fact all textbooks gave as its main cause—heredity. The blood was not understood; staining methods in the pathological laboratories were crude, and biological chemistry was a very promising infant but nothing more. In other words, corresponding to the lack of information at that time there was a fusing together in entities of diseases and conditions which we have since learned to be entirely separate. For example, rickets and tuberculosis, syphilis and gonorrhea, etc.

Not only may we say that they lacked information at the time when this formula for heredity was promulgated, but we may say also that the formula is never observed to operate. The only four-generation group that has been discovered is the group I have described in which no such transition occurs. Furthermore, in many of the instances where cretinism and idiocy arise, there is no history in the antecedents resembling the formula of the theory of polymorphism. I searched in vain in all the records of the 700 families I studied in Taunton for one case of genius and found very few cases of talent; also a remarkably small percentage of criminality. We have since discovered that neurasthenia may be a family trait but often it is an individual reaction to individual circumstances, rather than a mark of germplasm inferiority. On the whole it may be stated that in the era of a more analytic psychiatry, one which is busily engaged in finding types of psychoses and special causes for each type, polymorphism in the main may be rejected though there is some evidence of a limited type of transformation and a limited linking together of various mental states. The proponents of polymorphism have fallen largely into the fallacy of the positive instance; that is, they assume that whatever is abnormal in an ancestor may be linked up with whatever is abnormal in the descendant without any control statistics and without any regard for coincidence.

Of late years the biologists have introduced into psychiatry the concept of Mendelian heredity. No one need be accused of any criticism of Gregor Mendel when one states that Mendelianism in psychiatry can by no possibility be proven at the present stage of psychiatric knowledge. Mendelianism in psychiatry is based really on polymorphism, for Davenport and his co-workers, in order to prove their working hypothesis have been obliged to consider as psychopathic traits in all variety of relatives, an alphabetical list of conditions, starting with alcohol and running through apoplexy, blindness, Bright's disease, criminalistic, cancerous, chorea, crippled, deaf, deformed, etc., etc., through suicide, unchaste, tuberculosis, and up to vagrant. The list really is an insult to medical science. It completely ignores the fact that by no manner of means is apoplexy or Bright's disease to be discussed in this way; that suicide is a problem by itself, in part psychopathic, in part social and economic; that we have progressed in criminology by emphasizing the individuality of the delinquent and not by lumping him together with other categories. Upon such data no conclusions are worth while and especially when we realize that the data have been collected by individuals so instructed that their conclusions are practically included in the

instruction. It is hard for me to see how a man of science and of as great standing as Davenport can have sponsored such work as has been given so great a place in the psychiatric and eugenic literature of the past decade.

The blastophoric theory of Forel. Forel states in opposition to what is usually considered true Weismannism that the environment in the form of toxic substances and especially alcohol, may alter the germplasm so as to produce defective individuals and that this defect can persist for generations. This theory was lightly regarded by the majority of biologists who are still fundamentally wedded to the belief that environment and heredity represent two separate and distinct types of force, and that the main function of the environment is to select rather than create or to change. As a matter of fact it can be stated that it has not been shown that alcohol or syphilis for that matter, alters in any permanent way family groups or more than one generation of individuals. Unfortunately the question of the effects of alcohol has been tangled up with moral and ethical emotions and passions and this has completely obscured the issue here discussed—whether or not the use of alcohol by an ancestor can betray the deformity or defect of his descendant. It can be again stated that this has not been studied in the case of man, but there is no reason at present to doubt that the environment can alter in a more or less permanent way generations of individuals. I here cite as corroborative of this point of view, the work of Stockard and his colleagues, Weller, Frankel, Little, Tower, Guyer and Smith, and others. To show that irrespective of the problem whether or not acquired characteristics can be inherited, the environment can be so brought to bear upon the individual as to alter his germplasm and this in a manner which persists for several generations. Fundamentally, medical men are not concerned with the theoretical question of the inheritance of acquired characteristics in the technical meaning which biologists attach to this question. Dealing with the human being we are interested in the qualities and characters which appear in ancestor and descendant, and it is important to know that experimental science has substantiated the opinion that what happens to an ancestor may, and in certain instances does, alter the qualities of the descendant. This is not really opposed to Weismannism.

If it comes to a choice between the present attitude taken by psychiatry towards mental diseases and an attitude which denied that there was any inheritance whatever of mental diseases, I should favor as more true and more conducive to progress, the latter view. The first view applies to a limited number of the types of the psychoses and even in the case of these, does not explain the origin of familial mental disease. The present view leads to pessimism and the adoption of a policy which does not aim either at investigation of causes or at therapeutics. However faulty such work as Cotton's is, it is far better, it denotes a far healthier attitude, and one more likely to lead to results, than that of most of his critics. Psychiatry needs to investigate the inheritance of mental diseases and needs to separate out the groups one from the other; to study each group from every angle;

and to keep in mind that seventy-five years ago the leading medical men of the world were as firmly convinced of the inheritance of tuberculosis as psychiatrists to-day are of the inheritance of most of mental disease.

Discussion: Prof. G. H. Parker: It is hazardous for a biologist to speak to a body of experts on a subject they know so well and he knows so little about. Regarding methods of investigation, I know of nothing more depressing than to see a young woman who has had three or four weeks' experience in some laboratory turned out on the community to find out what its make-up is, and it is surely an unscientific method. There is only one kind of science in medicine as in biology; that is good science. We must keep away from bad science.

The whole question that has been raised about inheritance gives you an idea of what biologists are facing. The question is no more complicated than with mice and guinea pigs. The Mendelians have tried to divide them up according to unique characteristics which do not exist. Take the eye colors of the fly. Cases of eye colors have come to be so abundant that they merge so that one cannot distinguish one from another. It is true that an enormous flood of light has come with these Mendelian views and they are beyond what was expected twenty-five years ago, but we must not take them too seriously. They are in many respects artificial. It is true that the human being is enormously complicated. The human being is a very difficult problem, but I wouldn't have you think from what Dr. Myerson has said that we know earth worms any better than we know human beings. The ameba is transparent, but in another way it is not transparent. It is as much a puzzle and a perplexity as the human being is. Inheritance is a thing that is puzzling and complex because of its many sides; human beings are unlike other animals. There is the social side; human society is enormously complex. Man is peculiar in that he teaches. Very few animals teach. Man sets himself over all other organisms. That involves a kind of inheritance that we do not meet with in lower forms. The human being, like every other organism, is always doing something. Where do these capacities come from? How much is inherited, and how much drawn from the environment? I am talking. How much of it is inherited? I have a voice, a muscular and nervous organism, that has come through the germplasm that made me. In my speech lies simple inheritance and I don't doubt that many of the elements are Mendelian. The words I am using are not inherited. I picked them up in my social relations. In the simple operation of talking to you I am exhibiting an immense amount of organic inheritance and a corresponding social inheritance in the words I use. Both normal and abnormal persons are exhibiting a double inheritance continually. There is a certain amount that is organic and a certain amount that is social, and those are intermingled and so diverse in their aspects that it is simply impossible to separate the elements. In a broad way we are bound to admit a large amount of organic inheritance in every action, and the social inheritance we have also plays a very high and important part.

The matter has been touched upon of the inheritance of acquired characters. The acquired character is the character that affects the body in such a way that the germ cells transmit it. It is puzzling to make the distinction between direct inheritance and social inheritance, that comes from our intercourse with others. The inheritance that comes through the egg or sperm which influenced the body of an ancestor is a very simple and direct way of looking at evolution. The examples are very difficult to find. We do not know that the inheritance of acquired characteristics takes place. A protozoan is a single-cell form. The single cell is both a structural body and a reproductive element because the body is divided and direct substance goes on to the next generation. Inheritance in the protozoan is an inheritance that does involve passing on of the characteristic. That happens wherever nonsexual reproduction goes on. The sea anemone simply divides in two. The sea squibs show that in a like way; they divide. The higher animals, snails and clams, crabs and back-boned animals have not that characteristic. They do not reproduce nonsexually. The influence of the environment on the germ in higher animals was of extreme importance in Weissmann's day. Later he admitted that external influences do affect the germ. Experimentation shows they do. There is no doubt that there is influence of the environment on the germ and one may have a feature handed down from generation to generation. Temperature changes and other changes that pass through the body may produce changes. Chemical substances are the most important. The internal secretions affect the germ. The study of alcohol has been extremely interesting in its effect, and Stockard's work has shown that germ cells may be profoundly influenced by the circulation of alcohol in the body. The parent is not influenced by alcohol but the offspring are, infertility results, and the stock dies out. Pearl has pointed to the interesting fact that the weak germs died off; alcohol is a good material to kill off the weaker germs. In certain respects the alcohol element is interesting; it may be a selective instrument of value. But a chicken is not a man and what applies to one does not apply to the other.

The last number of the *Journal of Experimental Biology* has an article on eye color experiments. Guyer has shown now quite clearly, I think, that defective eyes are produced by the injection of lens materials in various ways in the pregnant females. Thus defective eyes are in both the male and female lines. Those in the female lines may be said to be due to its being carried through the placenta. In the male it is only the sperm cell that transmits to the next generation. That is a matter which raises the question, What is an acquired character? It is a character transmitted to the individual. How early in the development of the animal it occurs it is hard to say. These toxins which are handed on may be a self-producing substance which is handed on in a fashion that leads to a point where it is difficult to say what an acquired character is. The best evidence we have of acquired organisms seems to be from the ear, through work done at the Wistar Institute. The next best evidence is from the eye. I am not sure but that in Guyer's work we have what the biologists were

looking for; he succeeded in getting a reduced eye and disappearing retina. This may be due to the poisons from lens proteins. We may be learning a great deal about inheritance by these experiments without getting very far ahead of the old evolutionary problems from which they have sprung. These are matters, then, which show in a brief way some of the biological aspects which Dr. Myerson has referred to in detail.

The question of inherited or acquired characters has been studied by many reliable men, and they are working towards something that may in time give us some positive evidence. Modification of the germplasm by the environment does take place. It is for the psychiatrist to work out this problem. I wish to add in conclusion that we look to you for its solution, for you know man better than we do. You have concentrated on one animal, while we have spread over 500,000.

Dr. William Healy: I think Dr. Myerson was hardly fair to the situation in regard to the Kallikak family. Those of us who watched the material grow know that Goddard and Davenport did take into account a great deal of the criticism that Dr. Myerson offers. They felt, however, that if they could go into the community and so readily get reports of this nature concerning individuals there must be much truth to the story of extensive mental defect, etc.; and even if discounted 50 per cent there is a great deal of import in the reports. I am immensely critical of that type of work, when general community report is the basis of diagnosis, but still, I feel there is considerable to be said for the value of the efforts of these workers.

I remember years ago seeing a field worker at a meeting trace out criminalism and delinquency on a chart as being due to heredity, leaving out entirely the sort of environment that the delinquents were living in. I mean that bad housing, the influence of neighborhood spirit and bad companions, etc., were quite left out as possible causations affecting more than one generation. I regret very much to say that, as a result of a field worker having been with me at one time, material was published in a certain chapter of a certain book that I regard as quite unwarranted in its interpretations of heredity. I deplore any method by which we so readily pass judgment on the causations of human tendencies and psychopathic behavior because it leads to thoroughly unsound conclusions.

Dr. W. E. Fernald: Doctor Myerson and Professor Parker have shown some of the great difficulties in applying the theories of Mendel to the study of human intelligence. It is a far cry from a study of white and red peas to the study of human intelligence. The study of human intelligence implies a complex combination of factors.

I have had some experience with peripheral workers who have assembled material for eugenic research. These investigators, although liberally educated, had slight actual acquaintance with mental disease and defect. This lack of experience did not discourage them from accurately diagnosing cases of supposed inferiority or mental disease occurring one, two, three, or even four gen-

erations previously; in fact, a man who lived over the mountain one hundred years ago was diagnosed as rapidly and certainly as one who is now alive.

I proposed to one eugenic research worker that she begin with a certain admission number and study cases in order as they were admitted. She was not at all impressed by these run of the mine cases and I found in a short time that she was only interested in the cases where there were one, two, or more feeble-minded brothers or sisters in the family.

My office is near the front door of this institution and puts me in close touch with the siblings, parents and collaterals of my patients. As I see them, these visitors represent a very good cross section of our Massachusetts population. We are all familiar with the types of hereditary feeble-mindedness which are found in several sections of Massachusetts. No one doubts the existence of cases where the present generation is feeble-minded, and the father and mother as well. In my experience, however, these are the museum cases. In my institution it is very difficult to collect a group of this sort; in fact, we have just lost the classical family of mother and eight children who served for so many years for teaching purposes.

The material for Goddard's book on feeble-mindedness was found in central New Jersey, where the people described have been on an inferior moral, social, and economic plane for many years, and where they have intermarried for generations. I doubt if any such large group of similar cases could be found in Massachusetts.

Dr. Samuel Howe, the pioneer with the feeble-minded in this country, made a survey of all the idiots in Massachusetts. He obtained this information from the town clerks in every town in the state. This survey was made in 1848. A few years ago we got in touch with the town authorities in many of these towns and were not able to find a single feeble-minded person of similar name in any of these towns.

The study of mental heredity of human beings is difficult for many reasons, one being the fact that no observer can personally observe more than three generations. A few years ago I frequently lectured before women's clubs. At one of the meetings the lady in the chair said, "Please do not say anything about heredity. Every lecturer this winter has talked about heredity and our members have studied their ancestry with much dismay." So in the course of my talk I said, "I challenge any person here to go back three generations, including siblings, collaterals, and grandparents, without finding some instance of mental disease or defect." The members of the audience looked rather wildly at one another for a few minutes but no one responded to my challenge. I believe this is a safe challenge in any similar group. The incidence of mental disease in average American stock is not at all understood. We very much need a study of the heredity of the average normal child as found in the public schools. The work of Goddard and Davenport was done with institutional defectives, and they are largely of the hereditary type. The "accidental" defective without hereditary history is usually cared for at home, so

that both Goddard's and Davenport's studies, even if one admits all they claim, were made on a highly selected group of individuals. The class of parents who bring their children to the out-patient clinics and want advice represents a different social and mental level from that of the average committed defective.

In the public school mental clinics in Massachusetts, we are now examining about five thousand children a year, most of whom are technically feeble-minded. This group, of course, is entirely unselected except on the basis of their intellectual level. They seem to fairly represent the average American home; they come from the homes of the well-to-do, of the middle class, and of the poor. Many of these children have no siblings or collaterals with intellectual defect.

Dr. O. J. Raeder: When I went to medical school the professor of pathology began his opening lecture with the statement: "Pathology was the foundation of all medicine." Dr. Myerson with his iconoclastic housecleaning, this evening, has attempted to rid some types of mental disease of the grime and dust of symptomatic grouping, preparatory to their reclassification on a pathological basis. He has mentioned how certain mental diseases have been so studied and so learned about through pathology. He has mentioned paresis and shown how it was taken out of the vague group of insanities and brought back into the domain of general pathology. So with some feeble-mindedness, as cretinism, and syphilitic hypophrenia, which some authors claim doesn't exist. In this way some "disgraceful" mental diseases have been brought back into the "respectable" fold of general medicine. This is important from the viewpoint of mental hygiene and therapeutic psychiatry. The mother, for instance, carefully guards her feeble-minded or delinquent child from the common knowledge, due to a false feeling of disgrace about mental or moral disorders, instead of trying to find out why it is so. If such conditions are returned to the field of general pathology, the mother will readily bring her child to the children's hospital and so make it easier for the mental hygienist to examine and treat it.

Dr. E. S. Abbott: Dr. Myerson is to be congratulated on the sanity of his paper. We of this generation cannot solve the problem, as Dr. Fernald has said, so it is up to us to make such records as future generations can use in solving it. We should definitely make such records.

Dr. C. M. Campbell: Dr. Myerson has made a most interesting presentation of a complicated problem. In his discussion he has referred to dementia precox and to manic-depressive insanity as if they were definite disease entities. As a matter of fact, the present line of progress in psychiatric investigation is away from such a conception; one does not look upon dementia precox as an entity, any more than one looks on epilepsy or feeble-mindedness. The analysis of a schizophrenic condition reveals a most complicated series of forces at work. There is much that points to the importance of the constitutional factor in the schizophrenic conditions, but there are many problems connected with the topic of deterioration. The genetic

study of the personality is a fascinating study, and the recent suggestions of Bleuler indicate definite lines of investigation. Students of the heredity of mental disorders will have to consider the presence not only of individuals with well marked schizophrenic conditions or with pronounced schizoid personality, but also the possible existence of special groups of functions, the syntonie or cycloid and schizoid mechanisms, which may coexist in the same individual with varying preponderance of one or the other.

Dr. Myerson, closing: Professor Parker, whom I expected would disagree with me, apparently agrees. It is a great comfort to know that some biologists are willing to believe that the environment can alter the organism so as to produce defect or disease which runs for more than one generation. If a character does appear in one generation, and has appeared for the first time in the previous generation, it is not necessarily a question of any specific form of heredity. The question may be simply this: What has injured the germplasm to produce defect? Every group of people is concerned with the environment, not only as it alters or affects the individual himself, but as it alters the qualities of the next generation. It is not entirely improbable that chronic emotional states arising out of certain phases of the environment, or out of the reactions of individuals to environment, may alter germplasm. Emotion is organic; it has a tremendous endocrinal and vascular component and that endocrinal and vascular component may, according to our present knowledge, change germplasm. This means that social inheritance, which Professor Parker so sharply separated from germplasm heredity, is in some respects linked up with it; that social inheritance may possibly be a component of biological inheritance. I am inclined to believe that there is no sharp line of demarcation between that external environment, which we classify as environment, and that internal environment, which we call the body.

Dr. Healy began by rebuking me for my criticism in regard to the story of the Kallikak family, and then said we might discount 50 per cent of the matter as due to exaggeration or misinformation. But 50 per cent wipes out the difference between normal and abnormal heredity, as it has been well shown by Koller, Diem, and Jolly, as well as by every-day observation.

Heron pointed out that Davenport's instructions to his workers were such that they could not fail to bring in what they did. This may or may not be so. At any rate, I think we can dismiss from our minds any number of Kallikak families. If true they are museum cases, and therefore are not true examples of the bulk of feeble-mindedness.

Dr. Fernald, because of his wide experience, has the most solid contribution to give, but he has neglected to speak of the only valid work on feeble-mindedness and that is what he has recorded himself, as to the fate of the many people who have left his institution against advice, settled in the community, and in many cases married. Of those who married, the most led normal lives and got into no difficulties. Some had feeble-minded children; the most did not. Further-

more, and this is important, in view of the "appalling fertility of the feeble-minded," the families of these feeble-minded did not average one person to a family. What is really meant is the fertility of low cultural level, not fertility of feeble-mindedness. Dr. Fernald has pointed out a fact of importance: Institution cases are different from those studied in practice. The practicing psychiatrist sees a large mass of cases who spring from normal stock and who never reach the institutions.

Dr. Raeder has emphasized what I have tried to say, viz., that as we shall become better psychiatrists, as we get to know something about etiology and pathology, we shall get somewhere in our study of the inheritance of mental diseases. In this way, we may get to know the origin of dementia precox, etc.

Dr. Campbell's description of what Bleuler is trying to do, brings up the whole question of Freudian psychiatry. I see nothing gained by changing the name of dementia precox to schizophrenia and I see nothing gained by classifying mankind as "schizoid" or "syn-tonic." Freudianism is merely descriptive and analytic from a meta-physical point of view. At any rate, I see nothing in the present Freudian work which helps us in fundamental understanding of the genesis of familial mental disease. That may be my fault, but perhaps some other explanation can be found.

What we, as physicians, need to keep before our minds, is that every human being is an organic mass and has an organic background. Mood and emotion are organic. Heredity is organic and the environment is a mass of organic forces which penetrates within the individual, interplaying with the organic structures which we call in part, somatoplasm, and in part germplasm. It is inconceivable to me that the organic forces of the environment have no effect upon the organic forces resident within germplasm.

CURRENT LITERATURE

1. PERIPHERAL NERVES.

- * **Lindstedt, F.** CONTRIBUTION TO THE PATHOGENESIS OF SCIATICA
[Acta Med. Scand., 1921, LIII, 733-7. Med. Sc.]

Lindstedt has examined a series of cases of sciatica, diagnosed as such by others than himself in the principal hospitals in Stockholm. Among 100 consecutive cases he found as many as 91 which presented static changes of various kinds. Serious diseases of the knee were found in 14 cases, a history of rheumatic arthritis in 12, hip disease in 11, varicose veins in 8, affections of the spine, such as spondylitis deformans, fracture, etc., in 8, and pronounced flat-foot in another 8. In 5 cases there were pronounced traumatic injuries to the foot, and in 4 a high degree of relaxation of the ligaments of the knee associated with genu recurvatum. In as many as 7 cases the complications of sciatica were of gonorrheal origin. Lindstedt supplements these facts with the following comments: The diagnosis of sciatica having been made by various hospital physicians, not by himself, the objection could not be raised that his cases were in any sense picked. Most of the complications detected were serious and conspicuous; their coexistence with the sciatica could not be merely accidental, for the occurrence of affections of the knees, of polyarthritis, varicose veins, and flat-foot was too frequent to be explained away thus. Indeed, some of these complications were of a relatively rare kind. Again, when they were unilateral, they were invariably on the same side as the sciatica. Lindstedt concludes that sciatica is often an irradiating, reflected neuralgia, analogous to the trigeminal neuralgia following presbyopia or toothache.

2. CRANIAL NERVES.

- Schmidt, V.** ONE HUNDRED CASES OF PARALYSIS OF THE RECURRENT LARYNGEAL NERVE. [Hosp.-Tid., 1921, LXIV, 17-21. Med. Sc.]

Schmidt has examined the records of 85 cases of paralysis of the recurrent laryngeal nerve treated at the Rigshospital in Copenhagen, and of 15 similar cases at another hospital. He tabulates these cases so as to show the comparative frequency of the different causes, the sex incidence and the comparative number of right- and left-sided cases. As for the age incidence, when the bulbar, post-infectious, and traumatic cases under the age of 3 years were excluded, it was found that there was a steady rise from 35 to 60. After this age there was an equally steady

decline. In about 60 cases the cause of the paralysis was located below the upper aperture of the thorax. In 45 cases carcinoma or sarcoma was responsible. In 9 of the 13 cases of aneurysm of the aorta, the patients were men, and several of them had complained of hoarseness before suffering from any marked cardiac discomfort. As curiosities, 2 cases are mentioned in which heart disease provoked paralysis of the right recurrent nerve. All the 9 cases of new growths in the neck gave rise to right-sided paralysis, an observation which Schmidt correlates with the comparatively exposed course of the nerve on the right side. He concludes that to diagnose paralysis of the recurrent nerve and then to lose sight of the patient is unpardonable.

3. BRAIN, MENINGES, TRAUMA.

Rominger, E. TUBERCULOUS MENINGITIS OF CHILDHOOD.

The writer points out that the pathognomonic signs and symptoms of the disease all appear late in its course; earlier we see nothing but the picture of central stimulation. The X-ray examination of the lungs, which the author regards as one of the most important features of the diagnosis since it lays bare the miliary nature of the disease, does not show the characteristic speckling of the plate until the second stage (stage of sensory paralysis and motor stimulation); in some cases not until just before exitus. The demonstration of the tubercle bacillus in the liquor is notoriously tedious and difficult; moreover in 10-20 per cent of the cases they cannot be found. The spiderweb coagulum besides not being absolutely pathognomonic (the writer noticed it in a case of acute poliomyelitis) is not always in evidence. Cell count can deceive also. Therefore at this early period of the disease great difficulty will be encountered in differentiating tubercular meningitis from conditions of meningismus, from toxic states (particularly from the many sided picture of influenza), and lastly from the other forms of meningitis. The increase in pressure of the cerebrospinal fluid it is true is one of the very earliest signs and is almost never absent. But alone it can be of little value to us. Here most important evidence is given us by the albumin content of the fluid. For its determination the common tests used in urine analysis are too delicate as the cerebrospinal fluid normally contains traces of albumin. Of the qualitative tests hitherto used there are mentioned: Nonne-Apelt, Ross Jones, and lastly Pándy. The last test the author has found not only to be the simplest but also the most trustworthy. Pándy describes his test as follows: "To about 1 c.c. of conc. carbolic acid (one part of glacial carbolic acid plus 15 parts of distilled water) add one drop of cerebrospinal fluid. In a few seconds, at the level where the fluids touch, a smoky, bluish white cloud forms, as a sign that easily precipitable albumin (globulins) is present in the liquor in pathological amount." Fifteen cases of tubercular meningitis observed at the clinic all showed a positive Pándy, which remained posi-

tive throughout the disease. The first positive reaction was usually shown in the second stage, twice at the end of the first stage, once as early as the sixth day. Pressures ranged from 200-500; spiderweb coagulum was missing in six cases; the bacillus found in only three; cell count in five below the limit of normal, namely ten. In one case the conclusive X-ray plate was secured only six weeks after the first positive Pándy; the other symptoms and signs in the meantime being quite dubious. In 53 other cases in which a lumbar puncture was made, the Pándy was negative and in none of the cases was tubercular meningitis shown to be present. In 31 of these cases a Nonne-Apelt and Ross Jones were tried, the former giving three, the latter six positive results. Lues was excluded by the Wassermann in blood and liquor. Particularly in cases of influenzal serous meningitis, encephalitis, and pneumonia with profound toxic symptoms was the value of the Pándy proved. The author concludes therefore with other authorities that the Pándy reaction is the most trustworthy indicator of pathological changes in the cerebrospinal fluid. He points out, however, that all other diseases of the brain and its membranes which are associated with an increase in the albumin content of the fluid will give a positive Pándy. It is therefore not to be regarded as pathognomonic of tubercular meningitis unless cell count and general picture of the disease are taken into consideration.—Reported for the author by HERBERT S. REICHLE, from Irvington, N. J.

Edelmann. A SIGN OF CEREBROSPINAL MENINGITIS. [Wien. klin. Woch., November 25, 1920.]

Edelmann describes the following sign which he has observed at an early stage of cerebrospinal meningitis. On flexing the leg at the hip-joint with the knee extended, as in eliciting Laségue's sign, dorsal flexion of the great toe frequently occurs, as in Babinski's sign. The sign is met with in senile cerebrospinal meningitis, in which nuchal rigidity and Kernig's sign are sometimes absent. It is also present in cases of cerebral edema.

Laroche, G., and Peju, G. TYPHOID MENINGITIS. [Bull. et Mém. Soc. Méd. des Hôp. de Paris, February 5, 1920.]

Meningitis as a complication of typhoid fever the authors classify as follows: (1) Meningeal syndromes with a clear fluid in which the cell and albumin content is little if at all affected and the culture is negative. This form is always mild and generally clears up rapidly without affecting the prognosis; it is most frequent at the onset. As a rule it is of short duration, but sometimes lasts several days or even weeks. (2) Typhoid meningitis, in which typhoid or paratyphoid bacilli are cultivated from the cerebrospinal fluid (much rarer). The fluid is clear or turbid, but rarely purulent. The prognosis is grave, death being observed in about half the cases. (3) Suppurative meningitis due to secondary

infection with staphylococci, pneumococci, streptococci, etc., with or without typhoid or paratyphoid bacilli. These forms of meningitis are always fatal. The writers record a case of mild typhoid meningitis in a man, aged twenty-seven, occurring during a relapse of typhoid septicemia. The symptoms were slight and transient, but the cerebrospinal fluid was tested and contained an extremely large number of typhoid bacilli, which disappeared after two lumbar punctures. Recovery was uneventful.

Bell, Howard H. INFECTION OF THE MENINGES AND LUNGS BY A SPECIES OF ACTINOMYCES. [*Journal of Inf. Dis.*, 1922, XXX, p. 96.]

Infection of the central nervous system by branching thread-like organisms is rare. I have studied a case of primary meningeal infection with pulmonary embolic abscesses. Forty-six cases of infection of the central nervous system by this type of organism were found in the literature; in 15 cases the infection was probably primary in the nervous system and in 31 the infection obviously was secondary to a chronic focus, or foci, elsewhere in the body. In a series of 257 cases of infection by these organisms studied by Devan, 19 showed infection of the nervous system, and in a series of 109 cases studied by Ackland, 5 showed infection of the nervous system. These observations give some idea of the relative frequency of infection of the nervous system by these organisms.

A white adult male, forty-four years old, complained of headache and high fever. The patient gave a history of furunculosis for the past 4 or 5 months and of having had a small pimple on the outside of his nose about two weeks before admission. The illness commenced December 6, 1920, with a chill. December 8, the patient complained of cold in the head and fever. December 9 severe headache developed, with chills, and the temperature rose to 100 to 104° F. and continued until admission. Symptoms of meningitis became more and more evident. The cerebrospinal fluid was turbid and under increased pressure. The cell count was 2,300, 88 per cent were polymorphonuclears. Globulin and albumin were increased. The patient died December 20.

The findings on autopsy in the brain were as follows: On cutting the dura over the right temporal lobe a small amount of grayish pus escaped. The hypophysis was surrounded by a purulent exudate and both cavernous sinuses were completely filled with pus. In the anterior part of the middle fossa on the right side was a mass of exudate 1 cm. thick, which was adherent to the skull where the abducens and oculomotor entered. The entire base of the brain was covered with yellowish pus which extended over the right temporal lobe and to a less extent over the right frontal and occipital lobes. The involvement on the left side of the brain was less.

The entire cortex of the brain toward the base was covered with an exudate which was thickest in the sulci. Neutrophils and large mononuclear leukocytes were present in varying proportions. There

were circumscribed foci consisting entirely of neutrophils and in places there were areas of large mononuclear leukocytes containing large vacuoles. In many places the distended vessels were filled with exudate, and in some of these appeared a yellowish pigment resembling disintegrated hemoglobin. Masses of organisms were present in all of these localities. The entire pituitary body was covered with a fibrinopurulent exudate; the anterior part showed necrosis for a distance of 2 mm. The sections included the cavernous sinus which contained cellular exudate and masses of bacillary forms and what appeared to be branching organisms.

Anatomic Diagnosis.—Septic thrombosis of cavernous sinuses; purulent meningitis; septic emboli of lungs; edema and ecchymosis of conjunctivae were diagnosed. [Author's abstract.]

Surreau. ACUTE OTOGENIC MENINGITIS. [Rev. de lar., d'otol. et de Rhinol., November 15, 1921.]

The predisposing causes of acute otitic meningitis according to this author are bad hygienic conditions (which were particularly marked during the war), alcoholism, diabetes, adult age, and infectious diseases. Invasion of the meninges occurs (1) as the result of a trauma, the fracture opening a direct path to infection; (2) *via* the bones of the skull; (3) by rupture of an abscess into the arachnoid cavity. The lesions observed are of three kinds—namely, serous, purulent, and tuberculous meningitis. The purulent sometimes succeeds the serous form. In some cases only a generalized venous congestion is found, in others there are purulent patches, but the disease almost always occurs in persons whose mastoid process contains only a few cells. There is nothing special in the symptomatology, which is the same as that of every other form of meningitis. The clinical varieties are the fulminating form, the acute form (which is much the commonest), and the subacute form, which is very rare. Early diagnosis is important. The condition must be distinguished from the meningism occurring in infectious disease, cerebral abscess, and cerebrospinal meningitis. Treatment should consist in destroying the infective focus by making a wide trephine opening in the mastoid and temporal fossa, and slight incisions in the dura. Hot baths and lumbar puncture are also to be recommended.

Sharp, E. A. ARTIFICIAL PNEUMORACHIS IN THE TREATMENT OF ACUTE INFECTIONS OF THE MENINGES. [Am. Archives of Neurol. & Psych., December 1921, VI, p. 669.]

Injection of oxygen or air into the subarachnoid space, producing an artificial pneumorachis, has been used in 64 cases of acute infections of the meninges. The technic employed is the ordinary procedure of lumbar puncture with the patient lying on the side. After removal of as much fluid as will flow through the needle, the oxygen is injected by means of a 20 c.c. Luer syringe. The oxygen is injected slowly, using 5 to 10

c.c. as measured on the syringe. Removal of the syringe allows the gas and fluid to escape in a frothy mixture. Injection of the gas is repeated and the head and shoulders slightly elevated to allow the gas to reach the ventricles. This results in additional fluid escaping when the syringe is removed. The average amount of gas injected has been from 10 to 15 c.c.

The action of the oxygen is probably that of a mechanical agent in displacing the fluid and opening up pockets of adhesions. Of the total of 64 patients treated, 28 have died. In the meningococcus meningitis cases only the severe and apparently unfavorable cases were treated by this method. The mortality of 23 per cent compares very favorably with the statistics of all cases of meningococcus infection in which the antimeningococcus serum is used alone.

The mechanical effect of the gas in opening secluded pockets of infection has undoubtedly prevented relapses as none of the patients who have recovered have had a recurrence such as occasionally occurs in other cases. [Author's abstract.]

Thomson, O., and Wulff, F. MENINGOCOCCUS INFECTION PROBLEMS. [Hospitalltid., January 12, 1921.]

Why is meningococcus infection so prevalent among soldiers, and why recruits particularly? Some become carriers but are immune and these carriers are more dangerous than actual cases. These are problems attacked by this paper. In a recent epidemic in barracks containing 275 recruits, with 4 frank cases and 31 carriers, the meningococci of the more virulent type were found exclusively in one of the barrack buildings, including the four meningitis cases. These more virulent carriers and meningitis cases seemed to be restricted to the east side of the buildings, from which the sunlight was kept off by other buildings. This confirms the experience of others that dark and damp quarters are more liable to develop meningococcus infections than the sunlit and airy, other conditions equal.

Delahet. VACCINE TREATMENT OF SEROUS MENINGITIS. [Bul. d. l. Soc. Méd. d. Hôp., Oct. 29, 1920, XLIV, 32. J. A. M. A.]

Delahet's case confirms that in addition to the urticaria, arthritis, arthralgia and myalgia sometimes observed as manifestations of anaphylaxis, an anaphylactic meningitis is also possible, from overlong antimeningococcus serum treatment. It may develop immediately after the injection or not until several days later; in the latter case it is usually mistaken for a relapse of the primary meningitis. This antiserum meningitis may keep up, with intermissions, for some time. The puriform aseptic nature of the spinal fluid should suggest it, but only chemical analysis of the fluid is decisive; this discloses that the sugar content is normal or above, sometimes enormously high, in contrast to the subnormal sugar content with active meningococcus meningitis. Effectual treatment re-

quires the neutralizing of the precipitin which is formed in every spinal fluid after several intraspinal injections of antimeningococcus serum. When more of the antiserum is injected, a flaky precipitate is thrown down, extremely irritating for the nerve centers. Desensitization can be realized by subcutaneous injection of a mixture of the patient's spinal fluid and horse serum, supplemented by intraspinal injection of the patient's own blood serum as a kind of vaccine. This accomplished the purpose in the case described. The seric meningitis which had kept up for two months, without any signs of spontaneous decline, became attenuated at once after the intraspinal injection of the patient's own blood serum. The case teaches further that with persisting meningitis which does not seem to be due to partitioning off of the infectious process, no further intraspinal injections of the antimeningococcus serum should be made without testing the sugar content of the spinal fluid. If this is above or below normal, we will know whether there is merely irritation or persisting infection.

Richardi re and Sal s. ACUTE MENINGITIS DUE TO PFEIFFER'S BACILLUS. [Bull. Soc. de P d. de Paris, March 15, 1921.]

In 1911 Blacque collected fifty cases of meningitis in which he found the Pfeiffer organism. Infants nearly always died. Most of the recorded cases have been secondary to other manifestations of influenza. The present writers, however, record a fatal case in a male infant of four months in whom the meningitis was primary and there was no history of exposure to influenza. Lumbar puncture and puncture through the anterior fontanelle showed that the meningitis was cerebrospinal. The cerebrospinal fluid was purulent and contained a large quantity of Pfeiffer's bacilli. Immediately after being withdrawn the fluid formed a thick clot surmounted by a layer of clear fluid, as the writers had found in another case of meningitis due to Pfeiffer's bacillus. There was no autopsy.

Lortat-Jacob and Turpin, R. MENINGITIS IN ADULTS. [Progr s M dical, July, 1921, XXXVI, 31.]

A case is described with puzzling symptoms from a focus of softening in the brain, evidently from thrombosis from tuberculous endarteritis. Such lesions frequently modify the clinical picture of tuberculous meningitis in adults.

Tronconi, S. SHOULDER SIGN OF TUBERCULOUS MENINGITIS. [Pediatria, September, 1921, XXIX, 17. J. A. M. A.]

Tronconi's experience has confirmed the value of Binda's sign for the early diagnosis of tuberculous meningitis, as he shows by a number of case histories from extensive application of the test to sick and well. The sign is the sudden movement of the shoulder when the head is passively turned toward the other side. He places his hand on the

patient's head and turns it slowly and gradually from side to side to relax the muscles of the neck. When well relaxed, he twists the head suddenly and abruptly to bring the chin as near as possible to the other shoulder. As this is done, the first shoulder makes a sudden upward and forward movement and persists in this position, resisting attempts to reduce it, until the head is released. In the seven cases of tuberculous meningitis described this sign was constantly positive, and always before a positive response was obtainable with the Kernig, Lasègue, Nizzoli, Oppenheim or contralateral signs. It appeared contemporaneously with the Brudzinski sign. It can scarcely be pathognomonic of tuberculous meningitis, but in his experience it was positive only in the seven tuberculous cases, and was negative in two cases of hydrocephalus and one of cerebellar tumor, in some cases of Weichselbaum bacillus or pneumococcus meningitis, and in a case of serous meningitis with recovery after presenting the Kernig, Oppenheim and Babinski phenomena.

Le Dentu, R. EPIDEMIC MENINGITIS. [Paris Médical, July 30, 1921, XI, 31.]

Case report of two cases. Young man apparently recovered under intraspinal serotherapy, but a relapse occurred after a latent period of two or three weeks. External hydrocephalus with ventricular distention from hypersecretion was found.

Lewkowicz, K. VENTRICULAR ORIGIN OF MENINGITIS. [Archives de Médecine des Enfants, September, 1921, XXIV, 9. J. A. M. A.]

Lewkowicz presents evidence that meningococcus infection occurs through the choroid plexus—the seat of the production of the cerebrospinal fluid—and thus it develops first in the ventricles, spreading thence into the subarachnoid space throughout. Woringer has recently reported two cases in which the communication between the ventricles and the subarachnoid space seems to have been blocked from the very first. The consequence of this was that the disease was limited to the ventricles, and the clinical picture differed from the usual type. Nothing but puncture of the ventricle explains such cases, and allows introventricular injection of the antiserum. His two cases sustain Lewkowicz's assertions in regard to the inevitable primary ventriculitis as the first stage of meningitis.

Kollewijn, J. R. RHEUMATIC MENINGITIS. [Nederland Tijdschr. voor Geneeskunde, February 11, 1922, LXVI, 579.]

A healthy, sturdily built man of twenty-one became ill with pains in the joints of hands, feet, elbows, and knees, with but slight joint-swelling and moderate rise of temperature. No previous sore throat. For six weeks his condition was one of a subacute polyarthritis, which, however, gradually assumed a slightly septic character. During this period he had a typical erythema nodosum which lasted for two or three weeks

and then disappeared entirely. Six weeks after the onset, severe pains in head, neck, and back came on suddenly, with sluggish pupil-light reaction and definite signs of meningitis: loss of knee- and ankle-jerks: pulse slow, but at first not irregular: vomiting. The meningitis was regarded as septic. The condition fluctuated over a period of nearly three months. No microorganisms were found in the blood or the cerebrospinal fluid. The latter was under moderate tension, and was turbid. The spinal fluid contained a great many polynuclear leucocytes, a few mononuclear cells, and many endothelial cells: it gave a negative Wassermann reaction. After about two months there was optic neuritis, with nystagmus and irregular pupils, and plus lower limb reflexes. Patient died from paralysis of respiration about four months from the onset. The temporary erythema nodosum suggested either rheumatism or tuberculosis. Against tuberculosis was the excellent previous health, the absence of any pulmonary signs, the marked turbidity of the spinal fluid, the very large number of polynuclear leucocytes in it and also the continuous absence in it of any tubercle bacilli. Further, the course of a tuberculous meningitis after the onset of meningitic signs is usually very much shorter than in this case. [LEONARD J. KIDD, London, England.]

Miller and Lyon. CORYNBACTERIUM TRICHODIPHTheroIDE. [Am. Journ. of Med. Sciences, October, 1921, CLXII, 4.]

This rare organism, *Corynebacterium trichodiphtheroide*, has been isolated by these observers in a case of purulent meningitis in an infant with attendant bronchopneumonia. It was not pathogenic for rabbits or guinea pigs.

Lux and Adloff. RECURRING MENINGEAL HEMORRHAGE. [Bull. Méd., October, 1921, XXXV, 43.]

A clinical report of a woman forty-five years of age who had had four meningeal hemorrhages in a month. The first, in the cerebral meninges, was slight with intense headache and inability to move the right arm. A slight hemorrhage in the cauda equina occurred a week later. The third hemorrhage was more severe, apparently in the former foci. Coma was present for several hours. The fourth occurred three weeks later and induced coma and paraplegia of the legs and mental disturbances. No etiological factor could be found. She had seven lumbar punctures.

Heist, Cohen and Cohen. VIRULENCE OF MENINGOCOCCI. [Journ. of Immun., January, 1922, VII, 1. J. A. M. A.]

It would appear from the observations made by Heist and the Cohens that so far as the resisting power of the blood is concerned the susceptibility of men, in general, to meningococcic infection is quite low. Meningococci from the spinal fluid are much more virulent for man than

are the majority of the strains of meningococci which inhabit the throats of carriers. Some carrier strains are more virulent than others. Among those who have been in contact with a case of meningitis the percentage of carriers is sometimes very high, from 8 to 12 per cent. When meningococci, freshly isolated from the spinal fluid of a patient with cerebrospinal meningitis, are cultivated in capillary tubes or the whole coagulable blood of normal men, they are found to possess an ability to grow rapidly in that medium. This ability is not possessed by the majority of the strains of meningococci freshly isolated from the throats of carriers. Experiment has proved that there is a correlation between the ability of the meningococci (as well as certain other bacteria) to grow rapidly in whole coagulable blood and their virulence for the species from which the blood was taken. The spinal fluid strains of meningococci are much more virulent for man than are the carrier strains. Certain carrier strains grow better in whole coagulable human blood than do others. They are the more virulent for man. The majority of carrier strains are relatively low in virulence or are nonvirulent. The whole, coagulable blood of most normal men will permit the rapid growth of spinal fluid strains. This indicates that most men are susceptible to the attacks of meningococci that have passed through the human nervous system. The blood of but one among many normal men permits the rapid growth of carrier strains. This minority of men is more likely to develop meningitis after exposure to a carrier. It is probably among this group that most of the cases of meningitis occur.

Pestalozza, C. CEREBROSPINAL MENINGITIS IN INFANTS. [Rivista di Clinica Pediatrica, September, 1921, XIX, 6.]

In this study the author emphasizes the abortive, incomplete character of meningococcus meningitis in infants. This feature already much commented on by others is most marked in the early phase. The spinal puncture test is useful in leading one to appreciate the puzzling respiratory and digestive derangement.

Aree, J. MICROCOCCUS CATARRHALIS MENINGITIS. [Anales d. l. Facultad de Med. de Lima, May-June, 1921, IV, 21.]

This organism was isolated from the C.S.F. of a meningial patient who also had a severe malarial infection to which the meningitis had been attributed.

Kramer. MENINGOCOCCAL MENINGITIS FOLLOWING SEPTICEMIA. [Med. Tijds. v. Geneesk., January 21, 1922.]

Infection with Weichselbaum's meningococcus, according to this study, may give rise to three different conditions—namely: (1) Infection of the mucous membrane of the nose and throat; (2) infection of the meninges; (3) septicemia. In most cases meningitis occurs so rapidly

that it is difficult to determine whether it has been preceded by septicemia, but it is much commoner for definite signs of septicemia, such as purpura, endocarditis, pericarditis, arthritis, etc., to develop during the course of epidemic meningitis. There are some cases on record of meningococcus septicemia which run their course without any signs of meningococcal involvement, and others in which the meningococci after a septicemia of several weeks' duration finally settle in the meninges and give rise to meningitis. Kramer records an example of the latter condition in a youth aged nineteen, who, after an illness of six weeks (the septicemic nature of which was shown by continued fever, recurrent arthritis, erythema multiforme, and purpura), developed meningitis. Recovery took place after lumbar puncture without serum.

Urechia, C. I. LOCALIZED SEROUS MENINGITIS CAUSING MOTOR APHASIA, ALEXIA, AND AGRAPHIA. [Arch. Internat. de Neurol., February, 1922, XLI, p. 49 (1 fig.).]

An encysted serous meningitis may occur after traumas, or after localized infections such as otitis, meningitis, scarlatina, pneumonia, encephalitis, etc. The membranes become adherent, and the cyst contains a serous fluid. This circumscribed serous meningitis may involve the spinal cord, cerebellum, or cerebrum; if it be situated in a motor or a sensory area it gives focal symptoms, and most often the diagnosis is made of a tumor or epilepsy. Its seat of election is the Rolandic, or the cerebellar, or the ponto-cerebellar region. Urechia's patient was a woman of eighty-eight, who was admitted in cachexia, with chronic bronchitis and emphysema, myocarditis, aortitis, myotic rather rigid pupils, but nothing wrong with reflexes or sensibility. She showed motor aphasia, alexia, and agraphia, but no agnosia nor apraxia; yet she performed complicated movements a little awkwardly. Death from pneumonia. The brain was that of a senile dement, with vascular sclerosis. On the left side there was a serous cyst, almost as big as a pigeon's egg, situated in the cortical motor region; it had invaded and compressed the depth of Broca's region and the lower third of the Rolandic convolutions. It had also compressed the supramarginal convolution in the depth of the Sylvian fissure. There was a small old hemorrhage in the dentate nuclei, involving only their white matter. There was no focus of softening or localized atrophy, and no degeneration of the bulbar olive. Urechia suggests that the alexia was due to indirect compression of the supra-marginal gyrus, and that the agraphia may be attributed to the compression of the foot of the left second frontal convolution. [LEONARD J. KIDD, London, England.]

Lewkowicz, K. EPIDEMIC MENINGITIS. [Archives de Médecine des Enfants, June, 1921, XXIV, No. 6; J. A. M. A.]

This is Lewkowicz's fifth communication on the subject of specific treatment of epidemic meningitis at all ages. He emphasizes that the

antiserum has a sure therapeutic action if it can reach all the nests of meningococci in the ventricles. Obstruction to the circulation of cerebrospinal fluid should be suspected when there is a difference in pressure and in the albumin content of the fluid in the ventricle and in the spinal subarachnoid space. There is less secretion of fluid in epidemic meningitis than normal, and this is one of the causes of stagnation and accumulation of thick pus in the ventricles. By puncturing the ventricle, we can estimate its capacity at the time and thus detect stenosis of the ventricle, and also detect hydrocephalus in its incipency and trace its course. Inflammatory hydrocephalus is a consequence of the edema of the brain with epidemic meningitis. From the third to the tenth year the brain is generally vigorous and resistant enough to stand the pressure from the edema, but in artificially fed infants the brain tissue yields and, even in the breast fed, abnormal laxity of the brain tissue is not uncommon, as also in most children over ten. He reiterates in conclusion that the most effectual way to introduce the antiserum, especially when there is evidence of stenosis in the ventricle, is to make the injection directly into the lower portion of the lateral ventricle. The needle is inserted transversely to the skull on a line joining the parietal eminence with the external auditory meatus, opposite the tip of the ear, or 1 to 4 mm. above it. The needle has to be introduced from one-fourth to one-third of the transverse diameter of the skull at this point. This route avoids the motor zone, the needle passing by the second frontal convolution, and the needle does not have to be pushed in so far as for puncture of the corpus callosum. A decompressive operation should be considered in extreme cases of cerebral edema. On account of the grave dangers when the infectious process drags too long, treatment, especially for infants, should be prompt and energetic. He gives the minute details and charts of 29 cases, which brings to 114 the number he has thus analyzed. Only 3 of the total 31 infants recovered completely. A number of others recovered from the meningitis but succumbed to the effects of the hydrocephalus or the progressive spastic paralysis. It seems evident that there is scarcely a chance for complete recovery unless the infants are breast fed, and not always then.

Cot and Robert. MICROCOCCUS CATARRHALIS MENINGITIS. [Paris Médical, October, 1921, XI, No. 43.]

This note reports the cultivation of this organism from the C. S. F. of a mild case of meningitis. Orchitis was a complicating factor.

Worster-Drought. HYDROCEPHALUS COMPLICATING CEREBROSPINAL FEVER. [Journ. Neurol. and Psychopathol., February, 1921.]

Early recognition of hydrocephalic symptoms is extremely desirable, since speedy and repeated lumbar puncture, following the period of serum administration, will often be of much service in the acute stages and prevent chronic illness. When symptoms of internal hydrocephalus occur

and no fluid follows lumbar puncture the only effective method is drainage of the subarachnoid space above the obstruction in the dorsal or cervical region, the latter being usually the more successful. As soon as the skin is penetrated the stylet should be removed in order that the cerebrospinal fluid may escape directly the needle penetrates the subarachnoid space, thus avoiding injury to the cord. Should lumbar, dorsal, and cervical puncture all prove unsuccessful, obstruction from fibrino-purulent exudate having occurred at the foramen magnum, sphenoidal puncture may be tried before tapping the lateral ventricles. By introducing the needle at a point 2 mm. external to the supraorbital notch the most external portion of the sphenoidal fissure is reached, and on withdrawal of the stylet cerebrospinal fluid escapes if the hydrocephalus is generalized in the cranial cavity. Failing this, drainage of the ventricles may be tried, in infants through the lateral angle of the anterior fontanelle, or in older children and adults by Keen's or Kocher's method. Instead of trephining, the author has successfully punctured through a hole drilled in the skull over Keen's point, with equally good results and less shock than after trephining. Each side should be operated upon alternately. Incision of the corpus callosum and prolonged drainage through a wide opening has been advocated, one successful case being recorded.

Abt and Tumpeer. INFLUENZAL MENINGITIS. [Am. Jour. of Dis. of Children, May, 1921, XXI, No. 5.]

The Pfeiffer bacillus was isolated from the C. S. F., blood, nose, throat, and nasopharynx. The spinal fluid yielded a four plus Wassermann and reduced colloidal gold suspensions in the syphilitic zone. Morphologically typical diphtheria bacilli were found in large numbers in a nasal culture. Death occurred ten days after the onset.

Root, J. H. MENINGOCOCCUS MENINGITIS. [Am. Jour. of Dis. of Children, May, 1921, XXI, No. 5; J. A. M. A.]

Only one case of meningococcus meningitis with obstructive hydrocephalus developing during the acute stage of the disease was found in the literature by Root and now he adds one case. The symptoms are usually irregular and obscure. The most important ones are repeated convulsions, vomiting (not projectile), and after a week or more, bulging of the fontanel and rigidity of the neck.

Abt and Tumpeer. INFLUENZAL MENINGITIS. [Am. Jour. of Dis. of Children, May, 1921.]

Abt and Tumpeer discuss influenzal meningitis from observations on a case, and from the results of the study of cultures and animal inoculations with the bacillus isolated from the spinal fluid, blood, throat, nose, and nasopharynx. The disease occurs more frequently and is more severe in infants and young children than in adults. There is a widespread distribution of the influenza bacillus in the upper respiratory tract, and the organism is easily cultivated from the spinal fluid and sometimes

from the blood. In the spinal fluid it is usually pleomorphic, with many long thread forms, this being probably a minor variation of the influenza bacillus due to its habitat. A large number of polymorphonuclear cells showing no tendency to phagocytosis are present. There is not the typical leucopenia of respiratory influenza, and animals vary in their response to injections of the organism, although it is usually pathogenic for laboratory animals. Prognosis is exceedingly grave. Treatment consists in the administration of convalescent serum or normal serum, which promotes phagocytosis, together with frequent removal of fluid by spinal puncture, which increases phagocytosis. [B. M. J.]

De Angelis, F. EPIDEMIC CEREBROSPINAL MENINGITIS IN INFANTS. [Pediatria, March, 1921, XXIX, 6. J. A. M. A.]

De Angelis reports complete recovery of three or four infants, from five to seven months old, with severe epidemic meningitis. He injected the antiserum directly into the spinal cavity, giving from 150 to 160 c.c. in about eight daily injections. He reiterates that up to 200 c.c. can be given to young infants without harm; symptoms of intolerance do not develop usually until after several injections, with improvement far advanced. The meningococci disappeared from the fluid after two or three injections. If intraspinal injection is not practicable, or pyocephalus develops, the antiserum can be injected directly into the lateral ventricle which is simple and, he says, harmless. An autogenous vaccine by the vein may usefully supplement the serotherapy in the graver cases.

Christiansen, M., and Kristensen, M. MENINGITIS FROM THE INFLUENZA BACILLUS. [Ugeskrift for Læger, Copenhagen, April, 1921, LXXXIII, 17.]

The influenza bacillus was cultivated from three cases here reported. Meningitis due to Pfeiffer's bacillus is more common than generally recognized. Lumbar puncture frequently repeated is the main treatment; 560 c.c. of spinal fluid was drawn off in a month in the case that recovered.

Harbitz, F. "ENCEPHALITIS" NEONATORUM. [Norsk. Mag. f. Lægevidensk., 1921, LXXXII, 25-30. Med. Sc.]

Harbitz describes as a pathological curiosity a case of a child which survived birth only by about 14 hours. It was in about the thirtieth week, and the mother, who was a married woman with one child, suffering from albuminuria and pyuria. The infant showed no sign of syphilis, but the liver was cirrhotic, the kidneys showed doubtful signs of nephritis, and there were hemorrhages in the skin, kidneys, and peritoneum, as well as a considerable hemorrhage of the meninges, originating in all probability from an aneurysm of an artery in the Sylvian fossa. In addition to jaundice and ascites, internal hydrocephalus was found; and scattered throughout the central ganglia and the cortex of the cerebrum were large,

greyish-white and yellow necrotic patches which were partially calcified. Small granules of fat were grouped around the blood vessels of the brain. Harbitz, who is professor of morbid anatomy in Christiania, confesses to ignorance of the etiology of this condition. The internal hydrocephalus was evidently secondary to this condition, which is undoubtedly more common among the new-born than is generally supposed, and which Harbitz gives the comparatively noncommittal label "encephalitis".

Lindberg, G. POST-TRAUMATIC SEROUS MENINGITIS IN CHILDREN.
[Hygieia, 1921, LXXXIII, 15-24. Med. Sc.]

Lindberg suspects that serous meningitis is a comparatively common condition in children as a sequel to injuries to the head. Yet the published accounts of such cases are scanty—a fact traceable to the infrequency with which lumbar puncture is undertaken. Lindberg records two cases. One was that of a boy, aged ten, who fell on the back of his head as he was playing. The slight abrasion was ignored, but a couple of days later he developed headache and general hyperesthesia. Later he became drowsy and very sensitive to sound. The headache became more severe, but he did not vomit. On examination he presented the characteristic signs of severe meningitis, and the case would have been dismissed as one of tuberculous meningitis but for the history of a fall. Lumbar puncture revealed a pressure of 200 mm. and yielded 15 c.c. of perfectly clear fluid, in the sediment of which were only a few lymphocytes. Nonne's and Boveri's potassium permanganate reactions were negative. When lumbar puncture was repeated some time later, the pressure had fallen to 180 mm. Improvement rapidly followed, and though the boy was forgetful for some time, he ultimately recovered completely. In the second case the cerebrospinal fluid was under as high a pressure as 300 mm. The withdrawal of 20 c.c. effected an even more dramatic improvement than in the first case. This patient also recovered completely, and Lindberg is inclined to attribute both recoveries to the relief of pressure effected by lumbar puncture. It is impossible to say what the prognosis is in such cases in the absence of lumbar puncture, for by this alone can the correct diagnosis be made. Lindberg's paper is, in short, a plea for lumbar puncture in every case with signs of meningitis.

Cottin, E., and Saloz, C. MENINGEAL MANIFESTATIONS IN TYPHOID.
[Revue de Médecine, April, 1921, XXXVIII, 4. J. A. M. A.]

Cottin and Saloz describe four types of meningeal involvement in typhoid: the cases in which the cerebrospinal fluid is clear and sterile; those with typhoid bacilli in the fluid; those with associated infection with the typhoid bacteria, the fluid purulent, and those in which the typhoid meningitis is primary and isolated, the only manifestation of the disease. They report a case of this latter type, the previously healthy woman of thirty-five being taken suddenly with agonizing headache,

vomiting and syncope. Acute delirium followed, with fever of 104° F. and pulse of 100. Lumbar puncture gave relief and revealed the typhoid bacilli in the fluid. The blood was constantly sterile and did not give the agglutination reaction, but this was pronounced with the spinal fluid even late into convalescence. Recovery was complete in about seven weeks; there were no symptoms at any time from the intestines and no septicemia. The meningeal manifestations with typhoid usually precede the classic clinical picture of the disease, or follow it, or they may accompany typhoid septicemia without involvement of the bowel. They cite instances from the literature of each of these forms. The extra-intestinal lesions in typhoid generally locate at points damaged by old infection or other cause, in a goiter, in a gallbladder with calculi, in a malarial spleen, and in experimental lesions. In the case of isolated typhoid meningitis they report, the woman had had a needle break off in the spinal canal during an attempt at spinal anesthesia three years before.

Thomsen and Wulff. A MENINGOCOCCUS EPIDEMIC IN BARRACKS. [Hospitalstidende, January 12-19, 1921.]

Certain features of a small epidemic of meningococcus infection in a military school containing 275 men was closely studied. Search was made for carriers by a bacteriological examination of the nasopharynx of every soldier. Positive results were obtained in 31 cases, including the men who fell ill. Of this total, 16 showed Type A, with which 90 per cent of all the cases of meningococcal sepsis in Denmark during the past two or three years have been identified. In 4 of these 16 cases the infection gave rise to symptoms of disease; in the remaining 12 there was no clinical reaction. Of the 16 cases of Type A, 15 belonged to one barrack, and only one to the adjacent barrack. Thus the early isolation of the infected cases in the first barrack would seem to have been effective in preventing further spread of the disease. In 15 cases the "carriers" harbored meningococci of comparatively benign character, differing in essentials from Type A. The barracks ran north and south; the east side was dark and damp, the west side was comparatively dry and sunny. On the east side there were 139 men, on the west side 136 men. But though the number of men was almost exactly equal on the two sides, there were 22 meningococcus-positive cases on the east side, as compared with only 9 on the west side. Of the "carriers" harboring nonvirulent meningococci, 12 were on the east side, and only 3 on the west. As the authors' diagrams show, the meningococcus-positive cases occurred more or less in groups, two or three adjoining beds being occupied by "carriers," while another series of adjoining beds would prove meningococcus-negative. The authors suggest that the comparatively high incidence of meningococcus infection on the dark and damp side of the barracks should be correlated with the devitalizing effect of these factors on the human organism. [B. M. J.]

Schippers, J. C. TREMORS IN MENINGITIS. [Nederlandsch Tijdschrift voor Geneeskunde, 1921, January 29, 591.]

Schippers reports to the Netherlands Pædiatric Society his experience of the diagnostic value of tremors in meningitis during childhood. In the first case a baby showed a tremor of the arms which directed the clinical examination immediately to the correct diagnosis, *viz.*, cerebrospinal meningitis. The second patient, an infant of eleven months, was admitted for feeding-disturbances and vomiting. Forty-eight hours later a tremor was noted in the arms; lumbar puncture was then performed, and the case was proved to be one of cerebrospinal meningitis; only three days later was the clinical picture of meningitis manifest. [LEONARD J. KIDD, London, England.]

Shearer and Parsons. REACTION OF SPINAL FLUID DURING CEREBROSPINAL FEVER. [Quart. Journ. of Med., January, 1921, XIV, 54, J. A. M. A.]

In cerebrospinal fever it has frequently been noted that there is often a striking difference between the clinical symptoms shown by a patient suffering from this disease and the degree of infection or number of meningococci found in the spinal fluid on lumbar puncture. Shearer and Parsons suggest the possibility that in such cases the degree of acidosis is the controlling feature. If the spinal fluid contains less than the normal amount of glucose or other substance from which the meningococcus may form acid, or if the particular strain of the organism setting up infection has not the faculty of forming the usual amount of acid, the patient's fluid will show slight change in reaction, though large numbers of meningococci may be present. The absence of marked acidosis of the spinal fluid in such cases would account for the mild clinical symptoms. It may prove that those types of meningococcus responsible for fatal cases are always strong acid forming strains.

Harbitz and Hattehol. TUBERCULOUS SPINAL MENINGITIS. [Norsk. Mag. f. Laegevid., January, 1922, LXXXIII, 1.]

This clinical report of a young woman who after two weeks of headache, and pain in the loins, developed paresis of the legs and other symptoms of a poliomyelitis. Death took place in less than a month. The C.S.F. suggested tuberculous meningitis. Tuberculous meningomyelitis, leukomyelitis and poliomyelitis were revealed at autopsy.

Kramer, P. H. MENINGOCOCCAL MENINGITIS APPEARING AFTER A LONG-CONTINUED SEPTICEMIA.. [Nederl. Tijdschr. v. Geneeskunde, January 21, 1922, LXVI, p. 293.]

Kramer's case was one of meningococcal meningitis occurring in a man of nineteen after an interrupted septicemia of about six weeks' duration. Patient, a stoker, returned one evening with pains in all limbs, headache, tiredness, and feverishness. After a week in bed he went

out, but in two days pain returned, especially in calves and thighs; temperature was raised. His pains and other symptoms kept up, his temperature being sometimes of a continued type, but being chiefly remittent or intermittent. He had joint pains of a rheumatic polyarticular type, with very little swelling; these affected all the limb-joints, and were fleeting. He had frequent cutaneous eruptions, sometimes of an exudative erythematous type, at others purpuric. He felt ill, shivered, sweated, and had headache. After a month of this illness he had sudden violent headache, which made him scream out, with vomiting; the limb-pains also became worse. Signs of meningitis were now present, and the turbid cerebrospinal fluid showed meningococci. For the next week temperature kept up to 39.1° . After five days of violent headache, great neck-stiffness, much vomiting, and a general hyperesthesia, a general improvement set in, and the spleen could no longer be felt. He recovered completely in twelve weeks. A sepsis caused by meningococci may recover after weeks or months, or may prove fatal even without any meningitis. In a few other cases like Kramer's there was a premeningitic period of three to seven weeks, and in almost all of them, the meningitis set in acutely. Kramer did not use serum, partly because of the late appearance of the meningitic signs, and partly because he has not seen any strikingly good results from its use. [LEONARD J. KIDD, London, England.]

Caussade, L., and Rémy, A. MENINGITIS IN INFANTS. [Paris Méd., February 12, 1921.]

Great importance is here ascribed to the bulging of the fontanel. It is considered an early sign of acute hydrocephalus developing from meningitis. It is a result of a ventriculitis. A three months' old infant is described who had been sick for a month with a vague infectious condition. The diagnosis was fixed by a developing hydrocephalus, the fifty-second day. Meningococcus antiserum was injected directly into the ventricle through the fontanel, and the child improved. Nine days later it died. In infants this long latent phase of meningitis is frequently observed. The lack of fever and the alternations of improvement and aggravation in the general condition are other manifestations.

Riser and Roques. TUBERCULOUS MENINGITIS WITH POLYMORPHONUCLEAR LEUCOCYTOSIS. [Ann. de Méd., 1921, X, 1.]

Three cases of tuberculous meningitis are here recorded in which the authors found a leucocytosis with a high percentage of polymorphs in the C.S.F. Two were in children, the other in a man of thirty-five years. The disease was hyperacute, death following after three days, five days, and eighteen days respectively. In the first case there were 2,000 white cells per cubic millimeter, all polymorphs; 1,800 white cells per cubic millimeter, of which 92 per cent were polymorphs in the second, and in the third case, the leucocyte count was 301 per cubic millimeter,

53 per cent being polymorphs. Autopsy in the first showed a tuberculoma of the cerebellum surrounded by pus. A nonspecific meningitis was discovered, *post mortem*, in the others, but the tuberculous nature of the lesion was evident under the microscope.

Pehu, M., and Eparvier, H. ACUTE MENINGOCOCCAL MENINGITIS WITH MULTIPLE ARTHRITIS. [Lyon Méd., February 25, 1920.]

An infant four weeks old was seen with swellings of the right great toe (resembling gout), and the metacarpo-phalangeal joints of three fingers. There was also a slight Kernig and opisthotonos. C.S.F. contained polymorphonuclears, but no organisms. Meningococci were obtained from the left foot. Cachexia set in, and death occurred in four weeks. Although cerebrospinal meningitis is relatively frequent in the child, it is rarely met with quite so early in life. As a rule, the joint manifestations are limited and discrete. In the present case, however, the arthritis was multiple and of various degrees, ranging from simple swelling to suppuration.

Harbitz, F. CURABILITY OF TUBERCULOUS MENINGITIS. [Am. Jour. of Med. Sciences, Pa., February, 1921.]

From the results of his observations Harbitz concludes that tuberculous meningitis may heal, and even in cases in which rather extensive lesions with exudate and tubercle formation have developed. This curable form of meningitis has occurred largely in persons who have suffered from chronic and relatively benign forms of tuberculosis. It is probable, however, that a more important factor is increased resistance on the part of the body, which bears some relation to the age of the patient. It is interesting to note that while about 60 per cent of all cases of tuberculous meningitis occur in the first two years of life and quite regularly result in death, the cases with recovery have occurred in older children and in adults. [J. A. M. A.]

Bang, O. ASEPTIC PURULENT MENINGITIS IN UREMIA. [Norsk. Mag. for Laege., March, 1921. J. A. M. A.]

Bang reports two cases of purulent meningitis which seemed to be aseptic. It had developed in a man of forty and a woman of sixty with uremia, in the course of chronic or acute kidney disease, with fatal outcome in both. In the woman the symptoms had suggested a focus in the brain, but nothing could be found at necropsy. In the man there were no convulsions and the blood pressure was comparatively moderate, but vomiting was frequent and there was headache.

Regan and Cheney. TUBERCULOUS MENINGITIS. [Am. J. of Dis. of Children, November, 1921, XXII, 5. J. A. M. A.]

A case of tuberculous meningitis is reported by Regan and Cheney which presents a rare pathologic condition of the spinal meninges caus-

ing a dry spinal subarachnoid space. This was due to the diffuse infiltration of the pia arachnoid membrane, from the cervical to the lumbar region, with innumerable tuberculous granulations producing marked thickening of the membrane, and causing adhesions between it and the dura, almost completely obliterating the spinal subarachnoid space except in the spinal cul de sac. No case reports of a similar nature have been found in the literature reviewed.

Gilbert, W. MENINGITIS WITH TUBERCULOUS CHOROIDITIS. [Deutsches Archiv für klinische Medizin, August 12, 1921, CXXXVII, No. 1-2.]

This clinical report of a number of cases in which headache over the entire head was present in eight of ten cases of recent tuberculous choroiditis. Kernig was present in some. These meningeal symptoms subsided completely in two or three months. The author suggests that obstinate headache in young people with negative C.S.F. findings otherwise should suggest the possibility of this benign form of tuberculous meningitis.

van der Kool. PNEUMOCOCCUS MENINGITIS. [Ned. Tijds. v. Gen., November 26, 1921, II, 22. J. A. M. A.]

The supposedly healthy young woman was stricken down suddenly as with an apoplectic stroke. Symptoms of meningitis followed. Lumbar puncture gave some relief but the course was long, and there were some stiffness and pain in the spine five months later.

Rodger, T. Ritchie. CAVERNOUS SINUS THROMBOSIS. [Journ. of Laryng. and Otology, April, 1921.]

Four cases of cavernous sinus thrombosis are here reported. In the first the superior petrosal sinus had been infected from the ear without previous involvement of the sigmoid or lateral sinuses. A carbuncle of the nose was the point of departure of the second case. The sigmoid sinus was first thrombosed in the third and the process extended to the cavernous sinus, by either or both petrosal sinuses. The fourth case followed a frontal sinusitis infection. The results of operation are discouraging. Clots may be sometimes be removed from the petrosal sinuses by aspiration, from the inferior petrosal sinus by lavage of the bulb and from the superior by removing the dressing plug from the upper end of the wound in the sigmoid sinus daily and allowing the blood to flow freely for a time.

McKendree and Imboden. OSSIFICATION OF THE MENINGES. [Am. Archives of Neurology and Psychiatry, November, 1921, VI, pp. 529-539.]

The authors summarize the observations made by early investigators, and emphasize the extraordinary pathological findings that have been made by competent men. The nature, extent, distribution and at times, the

penetrating character of true osseous changes in the cerebral meninges make it probable that in the light of modern neurological technique, clinical signs of the presence of such lesions must be occasionally manifested. A very complete history and extensive examination of a case which the authors believe presents definite evidences of ossification of the cerebral meninges, is reported. The chief complaints were headaches for a period of nine years; vomiting, occurring at any time of night or day, at irregular intervals, aggravated by exercise; insomnia; lassitude; and lack of endurance. The physical findings of importance were pathologically increased deep reflexes of the right upper extremity; bilateral Hoffmann's sign; facial weakness of the central type on the left; and positive X-ray findings. Microscopic and gross photographs of specimens, and X-ray pictures of the skull in the case presented are included in the paper. McKendree and Imboden believe that their case is the first recorded that has been diagnosed during life and earnestly hope that attention will be given to the subject which will ultimately prove to be of occasional clinical importance. [Author's abstract.]

Frank, E. S. SEROUS MENINGITIS. [Nederlandsch Tijdschr. voor Geneeskunde, February 25, 1922, LXVI, 822.]

Serous meningitis is a very common symptom-complex and is seen in all sorts of infective conditions, as tuberculosis, syphilis, strepto-, staphylo-, and meningomycoses, typho- and coli-bacillosis, influenza, and after injuries with or without wounds. It is characterized by signs of increased brain-pressure, neck-stiffness, Kernig's and Brudzinsky's signs. Lumbar puncture shows increased pressure of the spinal fluid; the fluid is clear, contains more or less albumen, polynuclear cells, or lymphocytes. Occasionally the pathogenic agent is demonstrable in the fluid. Serous meningitis may occur in various forms, as preacute, acute, subacute, or chronic. The prognosis—apart from tuberculous meningitis—is not bad, provided suitable treatment be adopted, and is not determined by the form in which it appears, though it may happen that the patient dies in the earliest stage. Frank thinks that in these latter cases a spasmophilic diathesis or a status thymolymphaticus may possibly play a greater part than the local process. Among the large number of cases he records are several otogenic cases, one complicated with pyelitis, and some of lethargic encephalitis with ocular palsies. He lays stress on the importance of repeated therapeutic lumbar puncture so long as the pressure of the cerebrospinal fluid is increased. [LEONARD J. KIDD, London, England.]

Stenvers, H. W. CRANIAL TRAUMA. [Nederlandsch Maandschrift voor Geneeskunde, 1921, p. 347.]

After cranial injuries all sorts of surgical and neurological symptoms can occur. After any extensive wound of the cranium it is essential to cleanse the wound thoroughly and remove any driven-in spicules of

bone. Cranial fractures without localizing signs may be treated expectantly by rest. The absence of bleeding from nose, mouth, or ear does not exclude fractured base, nor does its presence prove its existence. *Commotio cerebri*, from the point of view of its symptoms, most closely resembles a narcosis. In a traumatic *commotio cerebri* the possibility of an intracerebral hematoma must be considered. The presence of a total hemiplegia from the onset is in favor of an intracerebral process, but a slowly oncoming hemiparesis after trauma is strongly in favor of an extracerebral hematoma. Positive changes in the lumbar spinal fluid do not prove the existence of an extracerebral blood-extravasation; the yellow staining that is commonly regarded as an absolute proof of the presence of an extracerebral subdural hematoma occurs also in large intracerebral bleedings (two of Stevers' cases showed this). Neisser-Pollack's puncture is in many cases necessary for a correct diagnosis and therapy. After every serious cranial injury the state of the eye-grounds should be immediately determined: an atrophy of the optic nerve can set in very quickly. Röntgen photos of orbit and petrous bone can often supply objective proof of fracture: but fresh hematomas cannot be thus demonstrated. Meningitis occurs very seldom after fractured base of skull but when it does it is usually fatal. The measurement of the pressure of the lumbar fluid is made by the mercury-manometer of Sharpe, so that no fluid escapes. A facial paresis coming on late after a cranial trauma has generally no serious prognostic import. In the differential diagnosis a systematic study of any aphasia that is present can be of value.

Pedrazzini, F. MECHANICS OF THE SKULL. [Policlinico, July, 1921, XXVIII, Med. Sect., 7. J. A. M. A.]

This long critical and experimental study analyzes the physics of the brain as modified by the mechanical conditions of the skull. Pedrazzini illustrates with concrete examples the various points he seeks to emphasize.

Young, Roy. CEREBRAL INJURY AND CRANIOPLASTY. [Glasgow Medical Journal, March, 1922.]

The main point of interest in this case was the question of the value of cranioplasty in order to remedy a defect in the cranial vault, where cerebral injury was also present. A year prior to this operation the patient had undergone operation for an extensive compound fracture of the right parietal region, when fragments of bone, which had been driven into the brain, were removed. As a result a considerable gap in the bone remained. There were signs locating the cerebral injury to the hand area of the post-central cortex and, to lesser degree, that of the pre-central cortex. In addition he suffered from headaches and giddiness and extreme tenderness of the scalp over the affected area. The possible disadvantage of closure of the bone gap

was considered to be the loss of a safety-valve during any edema of the injured portion of the brain. The advantages pointed to improvement in the headaches and tenderness of the scalp from freeing adhesions between brain and scalp, and to the better protection of the brain. At operation firm adhesions were found between the brain and scalp. A suitable bone graft was taken from the tibia and the periosteum sutured to the pericranium in order to maintain position. The wound healed without complications, except for transient twitchings in the left face and arm on the second day after operation. As a result some benefit was undoubtedly derived from the operation. Apart from the mechanical protection and its mental effect, there was great improvement in the headaches and tenderness of the scalp; the giddiness on stooping was checked, nor had any bad effects appeared from closure of the safety-valve. No effect was produced on the damaged brain tissue itself. [Author's abstract.]

Merlino, B. DECOMPRESSIVE CRANIECTOMY. [Policlinico, Nov. 15, 1921, XXVIII. J. A. M. A.]

Merlino expatiates on the advantages of Parlaveccchio's technic which does not require an opening larger than 3 by 3 cm. A horse-shoe flap is first cut down to the bone and turned back toward the neck. A square gap is then cut in the skull, and through this a crucial incision is made in the dura. Each one of the four flaps resulting from the X incision is turned back over the edge of one side of the opening in the skull, and each flap is sutured to the pericranium around. This prevents irregular growth of bone at the edges of the gap, while the dura flaps can be replaced and sutured at any moment.

Hanson, A. M. CRANIO-CEREBRAL INJURIES. [Military Surgeon, January, 1921].

This clinical paper reports a series of 44 cranio-cerebral injuries treated by operation. All head injuries should be freely exposed. The first stage consists of cleaning and trephining, after which all instruments should be re-sterilized, new gloves put on and the wound wiped with alcohol. The tract should be painstakingly cleansed with ethyl alcohol and, if possible, the foreign body removed. The dura mater, if torn, should be left open, for some edema always follows. Débridement of the skull should be done in the frontal and suboccipital regions. Over a skull sinus trephining should completely expose the sinus. In large eggshell fractures an effort should be made to cleanse the tract in the brain, but extradural bone fragments should not be removed.

Still, G. F. CEPHALIC BRUITS IN CHILDREN. [Brit. Journ. of Child. Dis., October-December, 1921, XVIII, 214-216. J. A. M. A.]

Still records the case of a boy, aged eight, who had a cephalic or intracranial bruit. It was well heard at both ears, perhaps a little louder

at the left than at the right, and was a low-pitched systolic bruit, very like the functional bruit which is not infrequently heard over the middle of the precordium in children. It was definitely a bruit and not merely the thud of pulsation. Still states that this bruit is not of serious import. He reviews the literature on the subject and analyzes 200 cases examined.

Conti. CEREBRAL HEMORRHAGE IN CHILDHOOD. [La Pediatria, February 15, 1921.]

Cerebral hemorrhage is comparatively rare in childhood. The usual contributory factors, sclerosis of the arteries and the formation of miliary aneurysms are absent. There is thus an absence of resistance to the blood stream and of a rise of arterial blood pressure and hypertrophy of the left ventricle which occurs when the patient's general condition of nutrition renders it possible. Simnitzky has claimed that arteriosclerosis in children is not so rare as is generally thought. Cerebral hemorrhage appears to be more frequent in males. In this paper a case in a female infant, aged eighteen months, is given. Left hemiplegia, preceded by convulsions the day before death, were the chief clinical signs. Autopsy showed a large hemorrhage in the right hemisphere. Degeneration of the vessel walls is laid to a chronic nephritis.

Vaglio. HEMORRHAGE IN THE NEWBORN. [La Pediatria, January 1, 1921.]

This clinical study of an infant, aged three days, shows the value of lumbar puncture in intracranial hemorrhage in the newborn. The child was born slightly asphyxiated. Forty-eight hours after birth, a series of convulsions developed. These increased in frequency and intensity. After removal of 10 c.c. of blood-stained C.S.F. the convulsions diminished in frequency and intensity. There were still a few convulsions a day later, but they ceased in the afternoon, and recovery was uniform.

Eagleton, Wells P. FRACTURE OF THE SKULL. [Archives of Surgery, July, 1921, III, pp. 140-153.]

The usual treatment of fracture of the skull is still of the pre-war type, but the war evolved a thoroughly new understanding of this subject, and definite features in its treatment are now recognized. Fractures of the skull primarily should be classified as either simple or compound. These present two fundamentally different surgical problems and require different lines of treatment. In simple fractures the surgical manipulations are limited to the relief of increased intracranial pressure and to the prevention of gliosis, while the surgical problems of compound fracture are the prevention of intradural sepsis in addition to the relief of intracranial pressure and the prevention of gliosis. The possibility of the associated cerebral trauma being irreparable, a frequent condition, has too often prevented an operation for the relief of cerebral compression. The surgeon can do nothing to repair lacerated or damaged brain

tissue; but if the cerebral compression is removed nature will frequently bring about a recovery from a cerebral injury which otherwise would end fatally. Every case of cranial trauma, even though the acute symptoms rapidly disappear, should be subjected to a routine neurologic examination which will frequently reveal positive evidence of fracture otherwise overlooked. The blood pressure of every patient with a possible fracture should repeatedly be taken, at least every hour for the first few hours, until a persistently rising blood pressure or pulse pressure is definitely excluded. The fundus in every case of suspected fracture of the skull should be examined within the first few hours. This should be repeated daily as long as the diagnosis is in doubt. Systematic ophthalmoscopic examination may show moderate increase in the intracranial pressure when absolutely no other symptoms are present. In all suspected fractures of the skull there should be performed a routine lumbar puncture, blood in the fluid being presumptive evidence of intradural hemorrhage. In many cases of cerebral trauma the irritation from hemorrhage and cerebral disorganization occasions an increase in the cerebrospinal fluid, which adds to the already increased intracranial pressure. This "vicious circle" may be broken by a lumbar puncture. A routine roentgen-ray examination of all head injuries frequently discloses very extensive fractures, even going beyond the median line, unassociated with any symptoms. It is necessary, however, that a negative roentgen-ray finding should not be taken as positive evidence of the absence of fracture. Several exposures in different positions may be necessary to demonstrate the presence of a fracture even when it is depressed. In every case of possible fracture of the skull all wounds around the scalp should be routinely excised and the incision extended in whatever direction necessary so that the skin flaps may be pulled apart and the bone exposed. This should be a routine in every hospital service. The principles underlying treatment of fractures of the skull are illustrated by reports of nine cases which have come under the author's direct observation, with descriptions of operations and autopsy findings, and the conclusions succinctly summed up in the final paragraphs.

The article is accompanied by a chart for the clinical classification and treatment of fractures of the skull, together with a guide for detailed neurologic examination. The guide is designed to enable hospital internes or trained attendants, without special training in neurology, to conduct a detailed examination by eliciting and recording the details of all objective and subjective symptoms. [Author's abstract.]

Tilmann. THE SKULL BONES AND THE BRAIN. [Arch. f. Klin. Chir., November 24, 1921, 118; J. A. M. A.]

Tilmann explains that when the contents of the skull bulge, the bone atrophies as an effort to relieve the pressure on the brain. On the other hand, when the brain shrinks, the space may fill up with fluid, or the bone hypertrophy, or both may occur. These processes are not of an inflam-

matory nature; they are evidence of reaction and repair: reduction of skull bone tissue when the content of the skull is disproportionally large, and hypertrophy when it is too small. The primary focus must be removed, whether in brain or bone. Our measures must be aggressive, and on the valve principle. By providing a valve, it can bulge out or sink in, as the circumstances require, and the disproportion is corrected.

Lindberg. TRAUMATIC SEROUS MENINGITIS IN CHILDHOOD. [Hygiea, January 16, 1921; B. M. J.]

The author suggests that though little has been published with regard to traumatic serous meningitis in childhood, this condition is far from rare. Were lumbar puncture to be practised whenever a blow on the head is followed by signs of meningitis, serous meningitis with increased intraspinal pressure would often be found. He records two cases, the ages of the patients being ten and four years, respectively. In both a slight injury to the head, caused by a fall on the ground, was followed in a few days by alarming signs of meningitis. In both the pressure of the cerebrospinal fluid was much raised, being as high as 300 mm. in the second case. The withdrawal of 15 and 20 c.c., respectively, of this fluid, the composition of which was normal, resulted in dramatically rapid improvement, and complete recovery was ultimately effected in both cases. The author advocates lumbar puncture in every case with signs of meningitis; however sure the physician may be that the condition is due to tuberculous or septic meningitis, he may be wrong. And even if a serous meningitis is due to the activities of the tubercle bacillus, it should not be regarded as incurable. The author has seen a case of serous tuberculous meningitis terminating in recovery, and he refers to four similar cases, observed in Göppert's hospital. It is still doubtful what the fate of patients suffering from traumatic serous meningitis is in the absence of relief of pressure by lumbar puncture; but it is certain that this procedure is remarkably beneficial.

Hammes, E. M. INTRACRANIAL TELANGIECTASIS. [Am. Archives of Neurology and Psychiatry, September, 1921, VI, No. 3; J. A. M. A.]

Two cases of probable cerebral telangiectasis are reported by Hammes. In one case a diagnosis of jacksonian epilepsy due to irritation of the right motor region, cause undetermined, was made and craniotomy was performed. Enormously dilated blood vessels were found on the pia over the right motor region, arranged in the form of an irregular circle. These were ligated in four places and the dura was closed. During the next twenty-four hours the patient had twelve convulsions of such severity that chloroform had to be administered. The following night he had two more and was then placed on two-thirds grain luminal three times a day. Since then he has had only one unconscious seizure but at about weekly intervals he has had twitching of the left arm with blurred vision lasting a few minutes. In the second case a diagnosis of beginning dementia

precox or of a cyst secondary to the trauma in the right frontal region was made. The dura was found adherent to the skull. The dura appeared bluish, which was due to a marked angiomatous condition on the surface of the brain cortex. This mass of blood vessels covered the entire operation field and appeared like a nest of bluish angleworms. Vessels were ligated in several places; bleeding was profuse but easily controlled. The patient made an uneventful recovery both physically and mentally.

Greig. MENINGEAL NEVUS ASSOCIATED WITH ADENOMA SEBACEUM.
[Edin. Med. Journ., March, 1922, XXVIII, No. 3; J. A. M. A.]

In Greig's case the cerebrumeningeal tumor was associated with right hemiplegia, epileptiform convulsions, and that peculiar skin affection known as adenoma sebaceum. The patient, aged eighteen, was the subject of "fits" during fifteen years and of paralysis of the right side during eleven years. The eruption on his face had been noticed at birth. At operation the Rolandic area was found covered by an enormous number of large veins, forming a vascular tumor, which projected into the upper part of the opening and extended to the great longitudinal fissure. Removal was impossible, so the whole area was gone round with catgut on an aneurysm needle, and every vessel that could be underthreaded was ligatured. Two weeks after the operation he was well. During the succeeding years he continued in fair health, and had no recurrence of his "fits." He was unable to obtain employment on account of his hemiplegia, which only improved and did not pass off; but he remained at home, able to take charge of matters there. Eight years later, however, he began to act strangely, and, finally, his mental condition was such that he had to be placed in an institution. [J. A. M. A.]

McKendree. CEREBRAL SUBARACHNOID HEMORRHAGE WITH RECOVERY.
[Neur. Bull., September-October, 1921, III, Nos. 9-10.]

A syphilitic, aged thirty-one, had suffered two apoplectic attacks. Sudden onset of severe headache, followed by vomiting, pain in the shoulders and lower back, rigidity of the neck, were the chief early symptoms. Three weeks later there was a sudden recrudescence of the early signs with tonic convulsions, delirium, etc. There was also a bradycardia, strongly positive Wassermann, leukocytosis, intraocular hemorrhages of the right, left facial paresis, and transitory clonus. The C. S. F. was bloody on four occasions. The hemorrhage resulted from the rupture of a very small aneurysm.

7. BRAIN, ANATOMY PHYSIOLOGY, VASCULAR DISTURBANCES.

Ayer, J. B. CISTERN PUNCTURE IN SPINAL SUBARACHNOID BLOCK.
[Am. Arch. of Neur. & Psych., January, 1922, VII, No. 1.]

Ayer, by a combined technic of lumbar and cistern puncture, says it is possible to obtain fluid both above and below a supposed cord lesion.

Furthermore, it is possible to analyze mechanical factors involved in the flow of the fluid, thereby determining the permeability of the subarachnoid space. He illustrates the principles involved in a series of cases.

Wells. INTRACRANIAL ANEURYSM OF VERTEBRAL ARTERY. [Am. Arch. of Neur. & Psych., March, 1922, VII, No. 3.]

A clinical record of a colored man with old history of cranial trauma and negative specific history who died of hypostatic bronchopneumonia, without symptoms of increased intracranial pressure or of cranial nerve paralysis during his last illness. A large aneurysm of the left vertebral artery was found on autopsy. It gave rise to much deformity in the cerebellopontile angle region. The sixth, seventh, eighth, and ninth cranial nerves were pressed upon and the left vertebral artery was shut off. Internal hydrocephalus from pressure on the aqueduct of Sylvius was marked. The patient had had roaring in the ears, dizziness, and "spells" three years before he died. His teeth had been extracted for neuralgic pains. Two months before his death he had an attack of syncope. He then had some difficulty of speech, decreased vision, and swallowing was involved. The aneurysm was a very large one.

Roger and Smadja. FAMILIAL LITTLE'S DISEASE. [Bull. d. l. Soc. Méd. des Hôp., January 20, 1922, XLVI, No. 2.]

A clinical report of a Little syndrome in two sisters, seven and ten years old, respectively. The father has a positive Wassermann and the children show specific stigmata.

De Massary and Delgove, R. LATENT SOFTENING OF LEFT OCCIPITAL LOBE AND HEMORRHAGE OF LEFT CEREBELLAR LOBE IN CEREBROSPINAL MENINGITIS. [Presse Médicale, April 1, 1922, XXX, p. 284.]

The writers report the case of a man of twenty-five who showed evidence of advanced arteriosclerosis, probably syphilitic, who, after six days of acute meningeal symptoms with fever, was suddenly seized with violent occipital headache. At the first lumbar puncture the cerebrospinal fluid was yellowish-red, and contained meningococci. Death occurred six days later. Necropsy revealed the presence of unsuspected softening of the left occipital lobe and foci of hemorrhage in the left lobe of the cerebellum. [Leonard J. Kidd, London, England.]

Wentzler. MEASUREMENT OF INTRACRANIAL PRESSURE. [Arch. f. Kind., January 28, 1922, LXX, No. 4; J. A. M. A.]

Wentzler describes with an illustration the little instrument he has devised to record the excursions of the greater fontanel during respiration. The range is smaller, the tighter the fontanel is stretched; the findings have to be estimated in relation to the diameter of the fontanel. Among its other uses, the gage may call for lumbar puncture at once, or it may show that a proposed lumbar puncture is unnecessary. The instrument

has shown that abnormal reduction in the intracranial pressure is more frequent and more pronounced than had been supposed possible hitherto. Its clinical importance is still a question.

Thompson, W. G. TRANSIENT HEMIPLEGIA. [Med. Rec., February 18, 1922, CI, No. 7.]

Arteriospasm of the vessels of the brain as a causative agent in the production of a transient hemiplegia is the general thesis advanced by the author of this paper. A localized cerebral edema, more pronounced in some than in others may thus result.

Uyematsu, S. A STUDY OF THE CORTICAL OLFACTORY CENTER BASED ON TWO CASES OF UNILATERAL INVOLVEMENT OF THE OLFACTORY LOBE. [Am. Arch. of Neur. and Psych., 1921, Vol. VI, No. 2, pp. 146-156.]

Case 1. Sixty-year-old man; epileptic insanity; died of bronchopneumonia. At autopsy, missing of the right olfactory bulb, rudimentary olfactory trigone of the right, absence of the right olfactory striae, and symmetry of anterior perforating substance were disclosed. In addition to these anomalies, the sulcus frontomarginalis of Wernicke on left side was rudimentary. Microscopically, a great reduction of the clusters of large polymorphous cells and small pyramidal cells in the anterior part of the pyriform gyrus of the right side was found. Tangential and radiate fibers showed marked degeneration. The neuroglia fibers, fine and dense, appeared to have replaced the involved part. No decided alterations were demonstrated in the rest of the limbic lobe.

Case 2. Fifty-eight-year-old man; died of arteriosclerosis with epileptic seizures. The autopsy revealed softening of the left olfactory bulb. Microscopically, the brain showed arteriosclerotic alterations throughout. Myelin sheaths and axons of the left olfactory tract presented almost complete degeneration. The clusters of large polymorphous and small pyramidal cells were notably decreased in number, some having apparently disappeared. Nerve cells of the upper layer showed also various grades of degeneration, including axonal reactions. Degeneration of myelin sheaths was observed in medullary substance as well as in tangential and radiate fibers. The character of gliosis in this part indicated a relatively fresh, and still progressive, degenerating process.

The author concludes, considering the pathological nature of the process, that the alterations found in lobus pyriformis of above cases are secondary and the cortical olfactory center of the human brain must almost certainly be in the lobus pyriformis. The author also expresses his opinion that there may be some casual relationship between epilepsy and the deceased condition of the olfactory center. [Author's abstract.]

BOOK REVIEWS

Kempf, Edward J. PSYCHOPATHOLOGY. [C. V. Mosby Company, St. Louis.]

This book has been before the public for some time and has met with a well-merited reception, both because of its fundamentally clinical value and by reason of its originality.

It is one of the most striking productions of recent years and should reach a reading public far outside of those interests which would seem to be limited within its title.

It is a book on human behavior, and presents a point of view that should appeal to everyone who views the human organism with physiological as well as psychological eyes.

For too many years the mental aspects of human behavior have been described in the language of academic psychology. Plato set a bad example which only in comparatively recent years has been thoroughly reevaluated. The advent of the behavioristic school permitted entirely new viewpoints to be developed, and the study of the unconscious, following the genius of Freud, has changed the map of psychology in quite unexpected directions.

Kempf has broken ground in both of these directions and has developed a synthesis of both of these newer intellectual tools and given us a work of immense significance.

In his initial and earlier study on the Autonomic Study of the Personality he sketched in bold outline the thesis which he has here filled out and substantiated with clinical material. His work stands on a firm biological platform. He has integrated the whole process of behavior from its earliest physico-chemical structural foundations, through its physiological developments, and finally its social importance in a splendid sweep of fundamental understanding.

True, it has taken a big book to do this—nothing but a serious undertaking could possibly accomplish it—but he has knit the entire gamut into a unitary pattern of singular ingenuity and most practical value.

The human being—society as a herd of human beings—is here presented not as a series of academic definitions but as a living, striving, craving series of physiological requirements. Man came up from segmented lower forms; he remains a highly complex synthesis of segments, brought together at different reflex arc levels to live individually and to continue to live racially.

Human behavior as well as all animal behavior can only be understood when the activities of these reflex arc levels are analyzable in terms of the accumulated mnemonic capacities. These are the emotions, the wishes, the sentiments which come to expression in metabolism,

in motion, in gesture, in speech, in thought, in social custom, and in cultural evolution.

The Personality has a Physiological Foundation—its evolution Kempf outlines in his first chapter. This Personality is developed in the earliest nucleus of the herd, the Family. This Family Psychology is thus a corollary of the first chapter. The extension of the family into the herd, and its struggles for those values, such as virility, goodness, and happiness—this is where Plato first tried to be apodictic—by which the herd should progress, these are developed in a third chapter. Thus are most ingeniously outlined the steps that lead to biological “health” and emotional “happiness” in the individual and in society.

Now follow the hindrances—first as the level of somatic defects—*i.e.*, organic inferiorities, where Kempf’s originality sketches the struggle that takes place in the segmental strivings in an inimitable fashion, and shows the influence on the personality in these efforts at compensation.

All of this is extremely logical, and the issues presented permit a new type of grouping of the resultant difficulties—his mechanistic classification—which is singularly effective, bold, and original.

Suppression, Repression, Compensation, Regression, and Dissociation, benign or malignant, these are the various rubrics under which the various psychopathological situations may be gathered. The chapters VI to XIV, in which this new arrangement is discussed, are filled with carefully studied case material which illustrates in most striking ways the far reaching conceptions which Kempf has elaborated.

No one who has had experience with this kind of material, and who has seriously endeavored to get into comprehending touch with the many bizarre and apparently meaningless symptoms, will be satisfied with the older descriptive psychiatry, in view of the wealth of penetrating observations contained in these chapters. The older psychiatry is as dead and as barren of real meaning as is the medieval theological psychiatry of the middle ages. Naming a symptom—in Greek or any other language—has its conventional jargon value, descriptive psychiatry has done this for us, it is true, but understanding something about why the thing is happening, this is the singular merit of this whole presentation. This vision is but the beginning of a rational therapy which the older psychiatries were singularly barren in offering.

We have no hesitancy in saying that this work is one of the outstanding contributions to the study and understanding of human behavior, and marks a definite milestone in the advanced evolution of a rational psychiatry.

Strohmayer, Wilhelm. DIE PSYCHOPATHOLOGIE DES KINDES-ALTERS. Zweite, neubearbeitete Auflage. [J. F. Bergmann, München.]

These twelve lectures designed for physicians, intelligent laymen, and pedagogues appear in enlarged and revised form. They are in

general high class popular lectures, thoroughly scientific yet not so loaded with technicalities as to defeat their purpose.

They first deal with general ideas of psychopathology and then discuss nervousness in children, psychopathic constitutional traits, neurasthenia and chorea, hysteria, epilepsy, congenital feeble-mindedness, ethical delinquents, and the more common acute psychoses of children. This is done in about 350 closely written pages which are definitely modern and catholic in spirit. The newer medical-psychological ideas replace the older theological-academic psychology thus importing to the work a practical stamp of observation and causal thinking.

It is a book which should appear in English. Its German, however, is not difficult nor unnecessarily stilted.

Finkbeiner, Ernst. DIE KRETINISCHE ENTARTUNG NACH ANTHROPOLOGISCHER METHODE. [Julius Springer, Berlin.]

In a comparatively recent contribution Freud has spoken of three stages in the wounding of man's narcissism. He comparatively early had to relinquish the idea that this world on which he lived was the center of the universe. Copernicus dealt this blow to the Ptolemaic cosmogony. Darwin gave man's conceit his next jolt. He was a legitimate descendant from more primitive forms. He was not something specially created—the lord of the universe—he was but slightly higher than the ape—often lower, alas—and millions there are still in the fatuous stage of the belief in their being under the special sanction of a divine providence. Finally man has slowly come to find out that his much vaunted conscious intelligence is after all a leaky sieve, and that the billion years of his phyletic inheritance has given a dignity to the "Wisdom of the Body" of which his conscious intelligence is but a feeble rush light. It is into some such spirit of humility that the reviewer has gradually been reduced as he has cut the pages and read here and there the contents of this most fascinating monograph.

Professor Wegelin, director of the pathological institute of Bern, tells us in a charming introduction that Dr. Finkbeiner is a practicing country physician. Notwithstanding this he has produced a work of truly great significance. The cretin problem has always interested the Swiss physician. Like the poor he has always had them with him. But unlike most unpleasant contacts the present author has developed through the stimuli of his surroundings a work of more than usual interest. He has started an analysis of problems which run back to the man of the Stone Age. When, in his careful measurements of his cretin patients, he has shown their developmental relationships—skin, hair, skeleton, etc., etc., to primitive man, even to the pygmy, neanderthal, aurignacian, and similar types, he has really offered us material bearing on the evolution of iodine function in its incorporation in living matter. This is the reviewer's metaphysical interpolation, warranted perhaps, but not mentioned by the author.

We would much like to extend this review into a critical exam-

ination of the numerous genius-like illuminations of the writer's various chapters. The Significance of Race for the Appearance and Spread of Cretinism. [Compare Jung's study on Psychological Types from the standpoint of Racial Phylogeny, which is a psychological parallel, appreciative of the fact that the psyche of mankind is as old as the soma, and that real comprehension of man's mental activities is a very difficult problem. Only the conceited really "know."] Cretinism in animals as well as in different races, seen from an anthropological angle, is the burden of this message. This is dealt with in the initial fifty pages of this 450 page book. The Osteology of the Cretin makes up the major portion of the second section of this monograph. Here is to be found a rich collection of data concerning variation in bony structures which are compared with older phyletic types in a most comprehensive and illuminating manner. One gets a glimpse of the evolution of the thyroid function in the phyletic development of racial advance which is highly stimulating, *i.e.*, if one is thinking in this frame.

A most fascinating section is called "Ergologie der Kretinen." Here social evolution receives much illumination through the author's capacity to see analytically as well as synthetically the macrocosm in the microcosm. The cretin—in the large—can be used to illustrate social evolution. The author does it in an inimitable manner. He has seemed to grasp the meaning of the infinite in the finite. He has claimed no such pretensions, but the facts are there.

Altogether a most unusual and illuminated contribution which contains much more than can be seen by the academician.

Jung, C. G. PSYCHOLOGICAL TYPES. Translated with an Introduction by H. GODWYN BAYNES. [Harcourt, Brace and Company, New York.]

It is a distinct pleasure after wrestling with a more than difficult original to find a translation worthy of its source, and even more in fact contributory to its elucidation. Such we meet with in this unusually lucid exposition of a series of problems of unusual complexity in the clear setting forth of which Dr. Baynes' Introduction is a noteworthy feature.

For some years Jung has been contributing to the problem of why different people feel or see or think things in so many different ways. "'Tis with our judgments as our watches, none go just alike, yet each believes his own." This is a poet's rendering of a most apparent phase in human behavior, and we can not but feel that back of the Freud-Jung schism there lies the effort of the son to seek for a broader platform than that to which the father would demand acquiescence. In a sense, not by any means apologetic, but earnest and sincere, the younger student would forge further into the field of dynamic psychology than his father, not unmindful of the stimulus, nor scornful of the methods of the founder of the pioneer into the uncharted seas of the Unconscious. We would gather that the "Unconscious" as a substrata of the phyletic inheritance of humanity, with great inequalities in the temporal cultural back-

grounds, is seen in much the same form by both Freud and Jung. Whereas, in a sense, the former would more rigidly demand that what it has to offer to human activities should be reached by strictly objective methods of research, the latter would claim that in *addition*, not in *contradiction*, other criteria are at the service of the student of human behavior and hence should be utilized. This trend showed itself in part in the Jung-Maeder emphasis of the prospective function of the dream, and the value that may be derived from a more implicit significance of the manifest content of the dream. The *latent* content was there, and of enormous significance; the *manifest* content was also a definite achievement and the forces going to form it were not without its significance as well. To overemphasize the former at the expense of the latter, was to leave something out in the evolutionary forces bearing upon cultural achievement. It was but natural that one should seek to ascertain a larger perspective of behavioristic phenomena as seen in a wide survey of the world's people.

Jung has here sought to get a comprehensive grasp of these radiating trends through a certain positing of types. Psychological Types he would call them, and on a basis of the manner in which the libido tends to distribute itself he would offer a general picture of the tendencies. Whereas he pins them down to a definite series of groupings, it is plainly evident that he would not dogmatize too strictly as to their specificity. One's first tendency is to feel that he departs from the dynamic situation of flux, to the more static presentation of categories, but the reviewer feels that this is an injustice to his viewpoint and only appears as such by reason of the limitations of our intellectual instrument which must perforce attempt to pin down that which is ever flowing.

The Introvert and Extravert ambivalent trends afford the primary dichotomy into which all types may, for descriptive and interpretative purposes, be divided. We are all familiar with this subdivision and it is a valid generalization. Whether, as a thought function, such a division principle be regarded as fiction, hypothesis, or theory, we are not here concerned. The author's masterly summation of examples from different fields of activity, from older and younger civilizations, from here and there on the face of the globe, would seem to raise it to the majesty of a valid theory and although this summary may seem diffuse and prolix to the impatient, the deeply felt importance of the situation, we feel, amply justifies the author's long discussions and minute presentations of Origin and Tertullian as the dichotomies in the theological field, of Nietzsche's "Apollonian and Dionysian" in the mytho-historical field, Spitteler's "Prometheus and Epimetheus" in the poetic field, James' "Tough-minded and Tender-minded," and Ostwald's "Classical and Romantic Personalities," are both less valuable, because of their less careful elaboration; Schiller's Naïve and Sentimental poets and the contrasts with Goethe are especially valuable.

Jung now advances a bit from his earlier foundations. This libido distribution which either flowing out on the object—Extra-

version, or flowing in on the subject—Introversion, is in need of further analysis. The psychological functions of Thinking and Feeling, of Sensation and Intuition are called into service. Thus he would construct an octavo (1-2): The Introverted Thinker and the Extraverted Thinker, the former deriving his material from subjective attitudes in the unconscious; the extraverted thinker from objective data and more conscious material; (3-4) The Introverted Feeling type and the Extraverted Feeling type: The former obeying inner empathies and subjective appreciations, the latter acquiescing in external object values—largely of herd judgments; (5-6) The Introverted Intuitive types who sink themselves in the depths of a "mystical participation" as many primitives do, and here Jung leans largely on Lévy-Bruhl's masterly elucidations of earlier phyletic mental activities, and the Extraverted Intuitive type, that knows what is wanted by the crowd, and can anticipate the movements of the stock-market, or the need for munitions or dress materials in fashions, etc. In the former one sees many artists, fanatics, cranks, etc., in the latter inventors, practical geniuses, etc., and (7-8) The Introverted and Extraverted Sensation types—the least clearly elucidated of Jung's types. In the former are the romanticists, those rich in subjective imagery. In the latter the realists, who largely from Missouri, demand to be shown. They want to touch, taste, feel reality as they conceive it, or they can not function. Most mechanistic scientists, so called, belong here.

In this general sorting of human behaviorism we can see much that is verifiable in everyday practice. The classification is excellent and we are inclined to believe, more fundamental and more valuable than any heretofore offered by any other student of human types. Like a Fresenius qualitative analysis of the chemical elements, Jung has given us a valuable "eintheilungsprinzip," and has most clearly emphasized in terms of the same metaphor that silver is different from calcium, and fluorine is of different nature from zirconium.

The different type reaction capacities are more or less specific and must be viewed from this angle. If in the analyst's effort to help the individual human being whose phyletic history has deposited more of one series of precipitates than another, he must be seen in his own frame—of relativity, and no attempt will be of service to try to transform him into another. Silver can not be made to behave or act like calcium and it is a delusion of the analyst or the pedagog to try to transmute one type into another.

Hence Jung's emphasis upon the *synthesis of the individual*, according to the main trends of his type. In vulgar parlance, this is what the search for a "vocational adaptation" aims at, or in an earlier crude phase of the same attitude what the "phrenologist" attempted by studying the child's bumps as the choice of a career. Similar crude, yet practical results, it is reported, are essayed by experts in handwriting, etc., etc., as to the applicability of clerks in certain jobs in South America. These last are *extraverted sensationists* who by studying a man's handwriting attempt to tell him

what is his metier in life. And it is astonishing at times to see how clever they are. None of this appears in Jung's book itself; indeed he might possibly deny any such implications, but we gather that the ground formulæ of such developments may be read back into the efforts that the author so ably presents.

He would essay to regulate and reduce to a more valid basis, the psychological trends that make human beings what they are. He would attempt to get away from dogmatic statements of what they ought to be to fit preconceived notions, and to offer to students of the unconscious who would sincerely pretend to help suffering individuals, a wider perspective of individual capacities for creative efforts.

In some circles we can see that the "flapper's" cry to lead her "own life" may be conceived to be in accord with the author's teachings, but we strongly suspect this is a monstrous distortion of pubescent strivings. If the author's book is more deeply studied it can be seen he is in line with the furtherance of the highest aspirations of human endeavor in all times.

N. B.—All business communications should be made to *Journal of Nervous and Mental Disease*, 64 West 56th St., New York.

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ORIGINAL ARTICLES

THE APPLICATION OF THE INTERPRETATION OF FORM TO PSYCHOANALYSIS *

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PUBLISHED POSTHUMOUSLY BY EMIL OBERHOLZER, M.D. (ZÜRICH)

In 1921 Hermann Rorschach published in the second volume of "Arbeiten zur angewandten Psychiatrie" (Bircher, Berne), under the title of "Psycho-Diagnostic," the method and results of a diagnostic apperception experiment (*Fordeutversuch*) consisting in the interpretation of casually created forms.¹

Since the publication of his paper Dr. Rorschach had been indefatigable in the further development of his work, accumulating one experience after the other with untiring industry. These experiences, aided by his great psychological power of apperception and his scientific talent, enabled him to develop the interpretation of the experimental records to an astonishing degree, one might almost say to dizzy heights. On April 2, 1922, Dr. Rorschach was suddenly carried off by death in the midst of his promising elaboration of the numerous problems raised by this experiment, a work approaching to genius, the results of which heralded a new discovery in the sphere of psychology. His early death carried to the same grave the bulk of his experiences and the conceptions based upon them.

The manuscript now given to the world is founded on a paper read by its author, a few weeks before his death, to the Swiss Psycho-

* First published in the "Zeitschrift für die gesamte Neurologie u. Psychiatrie," Berlin, 1923, Vol. LXXXII.

¹ The pictures were so-called "ink-skeletons," i.e., forms created by pressing down the middle of a sheet of paper on which blots of ink (black or colored) had previously been made.

analytical Society, in which Rorschach, who had already referred to psychoanalysis in a short section of his "Psycho-Diagnostic," had shown how the deeper connection of the extensive experimental results was effected. This connection appears to be as important for psychoanalysis as it is retroactive on the experiment itself and a possible theoretical foundation for its results.

The publication of the manuscript of the lecture is due to my friend's wish expressed in a letter at the beginning of March, 1922. He had, it is true, intended to add certain modifications and complementary information, the nature of which is unfortunately unknown to me and consequently lost. But I do not think that this is a sufficient reason for withholding the manuscripts from publication in a scientific journal. The fact that Rorschach seized the opportunity offered him by a single case of demonstrating the construction of the "psychogram" in every particular, a design which he could not carry out in his "Psycho-Diagnostic," where he was obliged to confine himself to a comparatively small number of summary examples, makes the publication of the manuscript a duty. The single example presented here can hardly fail to spur others on to renewed researches along the paths already trodden by Dr. Rorschach. Secondly, the author has introduced two innovations into this monograph which are not contained in the "Psycho-Diagnostic," viz., the "vulgar" answers and the "chiaroscuro" interpretations, about which this case teaches us very many essential things.

I have made only such changes as were absolutely necessary, and have not attempted to alter the author's phrasing: I have merely confined myself to modifying those passages which were obscure or difficult to understand. Dr. Rorschach wrote out the manuscript very rapidly at a time when claims were being made and questions rained on him from all quarters.

On the other hand, the first part contains some elucidations of my own (generally in the shape of footnotes) in order to make these ideas more accessible to those who have not read Rorschach's "Psycho-Diagnostic," and in the third part, where the relations between the experimental results and psychoanalysis are dealt with, I have added a number of supplementary passages on the facts of the analysis, which I have incorporated in the letterpress in order to avoid disturbing footnotes. More than this I could not do. Nor was it possible to overcome the difficulty that the contents of the manuscripts presupposes both a knowledge of the results of the experiment and of extensive and fundamental parts of psychoanalysis. Neither was it possible to mention so much of the history of the

disease as would have been necessary to prove in its entirety the correctness of the psychogram. I must therefore content myself with saying that I have nothing to add to the "blind" diagnosis made by Rorschach, and that I could not have better characterized the patient myself—whom I had had under analysis for nearly a year—than has been done by the psychogram. This psychogram is a testimony of the intricate and complicated trains of thought and reflections which Rorschach was pursuing at the last, and proves the masterly manner in which he had perfected the interpretations of the experimental records after the publication of his "Psycho-Diagnostic."

E. OBERHOLZER.

Two years ago I made in these circles my first communication regarding experiments in the interpretation of form. The experiment has since been further developed. The methods of making the records, as well as the pictures, have indeed remained unchanged, but there has been a development in the utilization of the records, the symptomatic values of the factors, and the manner of interpretation. The theory of the experiment, however, has not yet made any great progress.

To-day I should like to take a case for the purpose of illustrating in the first instance the manner of enumeration, and to describe the method of interpretation and the diagnostic. Finally, I should like to make you acquainted with a fresh aspect of the experiment which is probably destined to have an important bearing on psychoanalysis.

1. THE EXPERIMENTAL RECORDS

(Formulation of the Interpretations, and Calculations)

The record sent me by my friend Dr. E. Oberholzer for "unseen" or blind diagnosis, which bore merely the indication of the age and sex of the subject, deals with the case of a man of about forty, whose interpretations of the ten test pictures were as follows:

*Picture I.*² "A bat." Formula of this interpretation = $GF + TV$.³ G means that the picture was interpreted as a whole. Opposed to this manner of interpretation (G) are the other manners

² Cf. the annexed sketches of the pictures, which attempt to reproduce at least those parts of the pictures interpreted by the patient. The colored parts of the pictures II, III, VIII, IX and X are denoted by the names of the colors written on them; the other parts are black. It only remains to add that even the noncolored sketches cannot replace the pictures and that not single pictures, but the whole series, which fulfills definite experimental purposes, must be used for the experiment.

³ Rorschach used, of course, the letters of the German alphabet; thus G =Ganzes.

designated by *D*, *Dd*, *Dzw* and *Do*, all of which we shall meet with in the subsequent interpretations, except *Do*.⁴ Of these *D* (=Detail) means that only *part* of the picture was interpreted, namely, one of those parts which, owing to the configuration of the picture, penetrate most easily to the field of vision, or whose position makes them the easiest to pick out. At the same time they are the *D*-interpretations which appear most frequently. *Dd* (=Kleindetail) means that the detail of the picture that has been picked out no longer belongs to those usually interpreted, *i.e.*, is unusual or extraordinary. *Dzw* (=Zwischenfigur) is the sign for those cases in which not the black



parts of the picture, but the figures within the black outlines, the space-forms (*i.e.*, the accidental pictures formed by the spaces between the silhouettes) are interpreted.

Of the other parts of the above formulae, *F* means that it is the form of the picture which has alone determined the answer, *i.e.*, that neither kinesthetic factors nor the influence of the colors has helped in the interpretation. The plus sign denotes that the form has been sharply apperceived, although, according to my subjective estimate, this is not really the case. But the subjective valuation must not decide as to the quality of the apperception, but rather the statistically

⁴ By *Do*, as oligophrenous small details ("oligophrenous" because they are never wanting in cases of oligophrenia=imbecility), Rorschach means interpretations by which, when other persons under experiment interpret clearly-seen human figures, etc., others see only a part of the body, etc., of these human figures. "Psycho-Diagnostic," p. 29.

proved frequency. Picture I has very often been interpreted as "a bat" not only by unintelligent, but also by intelligent normal people. "Bat" is even a so-called common or "vulgar" answer, *i.e.*, the answer given by about one out of three normal persons. I have designated this interpretation by *V*. Finally, *T* denotes that an animal figure was seen ($T = \text{Tier}$).

2. The second interpretation is a "skeleton," by which the subject means the upper half of the medial part. This is an apperception in detail and a form-answer, but this time the form has not been sharply visualized. The formula for the whole is *DF*—anatomy.

3. "A skeleton in a light wrapping," *DF* + anatomy, *i.e.*, an answer which may be qualified as a well-seen form, as the middle part, which is now taken as a whole, is frequently interpreted as a human figure. It is quite possible that a kinesthetic factor has played a part here, but this is not certain. The same is true of the effect of the shading, perhaps indicated by "wrapping." In cases in which it is questionable whether a mere form-apperception or a combined apperception is present, nothing more can be done than to write *F* for the time being, and to correct it later, perhaps, after a comparison of the totality of the replies given.

4. Finally the picture is once more interpreted as a whole: "A flying being." The bat and the wrapped-up figure are here combined to form a fresh interpretation. If kinesthetic factors have aided in the interpretation, they are of secondary nature only, and the formula is consequently *GF* + *M* ($M = \text{Mensch}$), being the human figure indicated.

Picture II. 1. "Two clowns," *GB* + *MV*, *i.e.*, a kinesthetic answer ($B = \text{Bewegungsantwort}$). Comparison with more extensive material shows that a kinesthetic component is requisite for this interpretation,⁵ whether the subject says anything about the movements of the clowns or not.

⁵ In his "Psycho-Diagnostic" Rorschach defines the kinesthetic answers as follows: "Kinesthetic answers are those interpretations which are determined by the form-apperception plus kinesthetic additions. The subject imagines the interpreted object as being in motion. . . . It may be formulated as a rule that kinesthesia are to be met with when human beings are seen. But even then we do not always get *B* answers. The question always is. Has the movement that is mentioned a primary share in the determination of the reply? Is it really a feeling of movement, and not merely the apperception of a form which is only secondarily interpreted as being in motion? . . . Answers determined by kinesthesia can be divided into good and bad *B* answers. Those which correspond but poorly to the form may be denoted as *B*— (pp. 13, 14, and 17).

2. "And yet, again, a large park road (=space-form) surrounded by fine dark trees (=black) which ascends here (=middle, black) and is lost in the distance in a balustrade, the whole quite perspective." This interpretation was determined not only by the form alone, but also by the shading. Black and white are here color-values. Such color-answers are not to be considered as being equal



II

to actual color-interpretations, and, as "chiaroscuro" interpretations, are to be appreciated otherwise, as we shall see later. One of their great peculiarities is that they accentuate space and perspective, whether expressed or not. I denote them by bracketing the color sign (*Fb*) (*Fb*=Farbe), and the formula of the interpretation which approaches the original answer, *i.e.*, interpretations which, in about 100 experiments with normal persons, occur about once, is, accordingly: *DzwF(Fb)* + landscape.

3. . . . "and the red here, a fire which develops smoke, and the smoke rises to the top, where the flames break out again." This, too, is a *G* interpretation, determined in the first instance by the color and then by the form: *GFbF* "fire and smoke" *O* (*O*=original answer).

Picture III. 1. "Two 'mashers' (dudes), who bow and greet each other correctly according to the prescribed forms of etiquette.



III

They are in dress clothes and are holding their top-hats in their hands." I designate this answer as *GB + MV.*, *i.e.*, a "whole" answer, because, although the red parts are not taken into consideration, the black figures are the principal ones of the picture.⁶

2. "As if the red thing in the middle was a force that is vio-

⁶ This is not only a common or "vulgar" answer, but at the same time a kinesthetic one. I refer to Rorschach himself in his "Psycho-Diagnostic," p. 14: "In this connection Picture III is important. Generally it is interpreted as two waiters who are carrying a champagne bucket between them, or something similar. The fish-like figures (black below, at the sides) are thought of as the waiters' legs, although separated from the trunk. In all probability a primary kinesthetic factor is necessary to be able to overlook this dividing line. Hence these answers are to be considered as kinesthetically determined."

lently separating the two figures or preventing them from coming together." This interpretation can only be designated by *D*? "abstraction."

Picture IV. 1. "A column of smoke springing up sharply in the middle and dividing and spreading, to lose itself within at the top." This is *GF(Fb) + smoke O*, as the color, i.e., black-and-white and the form together determine the interpretation.



2. "And at the same time these might be two human figures in a bending attitude, with their legs hanging down (=the serpentine appendices at the sides), the head there (=black, above the hump in the upper margin, where the serpentine appendix begins), the face turned up (the "hump" just mentioned) and the arms (=the thin line at the sides which encloses a white field with the serpentine appendix). This is a *D* interpretation, almost on the borders of *Dd*. It is a true kinesthetic interpretation and likewise an original answer; hence *DB + MO*.

3. "On the whole the impression of something powerful in the middle, to which everything clings." This interpretation cannot be put into a formula.

Finally, the subject repeats the first impression: "A typical smoke formation; I don't see anything else."

Picture V. 1. "Also a symmetrical body in a flying position, with two feelers." It would appear that a flying animal is in his mind; hence the formula $GF + T$.

2. "But there, outside, the lower part of a human body, with a leg and a wooden leg" (=the lines at the side): $DF + Md$.



Picture VI. 1. "A symmetrical figure with a strongly pronounced medial axis around which everything revolves. Remarkable!" This is again an interpretation that cannot be formulated, as it belongs to the category of descriptive answers.

2. "It is the skin of a beast of prey, with a strongly marked backbone tracing." A "vulgar" answer: $GF + TV$.

3. "I don't see anything else. But this white line in the middle is remarkable: this line of power around which everything is arranged." This reply is, again, half-descriptive, half-abstract, one of those interpretations that cannot be classified and are not usually so frequent. In our interpretation of the experimental records we shall have to deal with them *in extenso*.

4. "The whole thing is also a spread-out insect, quite flat": $GF + T$.

Picture VII. 1. "This again is a typical basin (pelvis) (=attached parts): DF — anatomy.

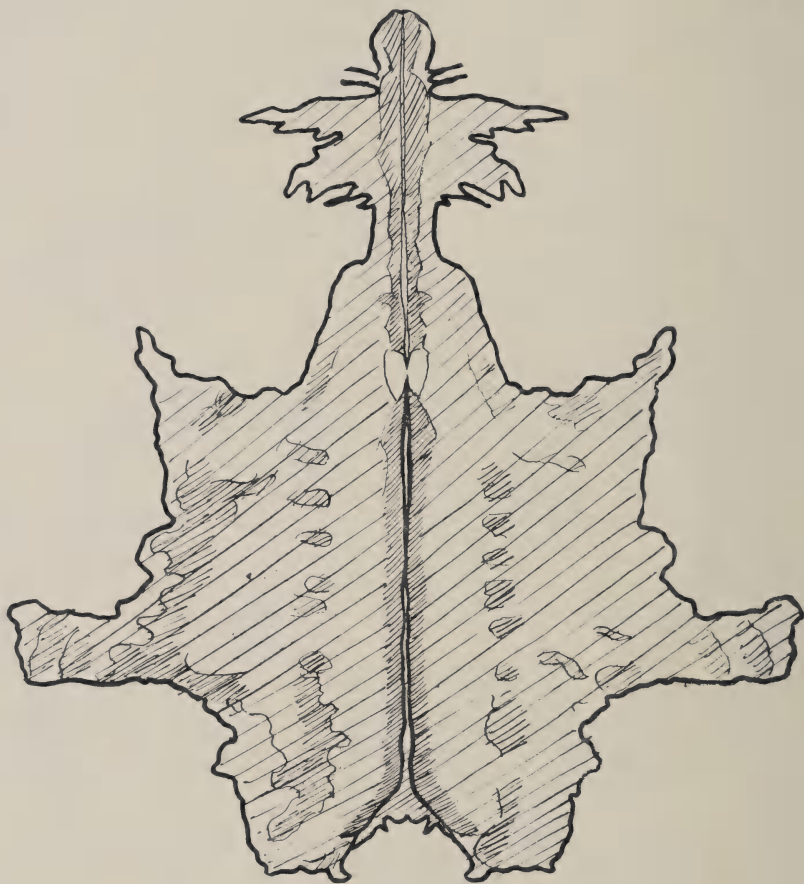
2. "Then this center-piece again (=the connecting stroke) from which thick clouds of smoke arise which take on forms": $GF(Fb) + \text{smoke}$.

3. "These are typical gargoyles (=the middle third part), like rodents": $DF + TdV$.

4. "And two such appear to come out there (=upper third)": $DF + MD$, "M," as these parts are generally interpreted as human faces, *i.e.*, gargoyles.

Picture VIII. Here the answer was long in coming. At the instant when the colored pictures are shown there ensues a lack of association which I designate as "color-shock." Then the subject said:

1. "this is again a category of animals (=the side figures), a kind of bear or dog with strongly thickset bodies and short legs;



VI

their tails are hanging onto the lower part of the picture": *DF + TV*.

2. "Here is once more a typical dorsal column, like a backbone": *DF + anatomy*.

He then looked at the picture for a long time, and finally declared that he could make nothing more out of it.

Picture IX. Here, again, there was a long pause, much longer than the previous one. The subject then shook his head and said:

1. "At the best, there are two animal heads, a muzzle" (in the green, losing itself a little in the brown): $DF + Td$.
2. "The other is a figure that you can't make much out of."
3. "This is the typical Norwegian coast (=protuberant medial parts of the small brown figure). It is situated exactly like it and is heavily shaded; the mountains; and there is Sweden, not so mountainous" (=exterior part of the brown figure): $DdF(Fb) + geog-$



VII

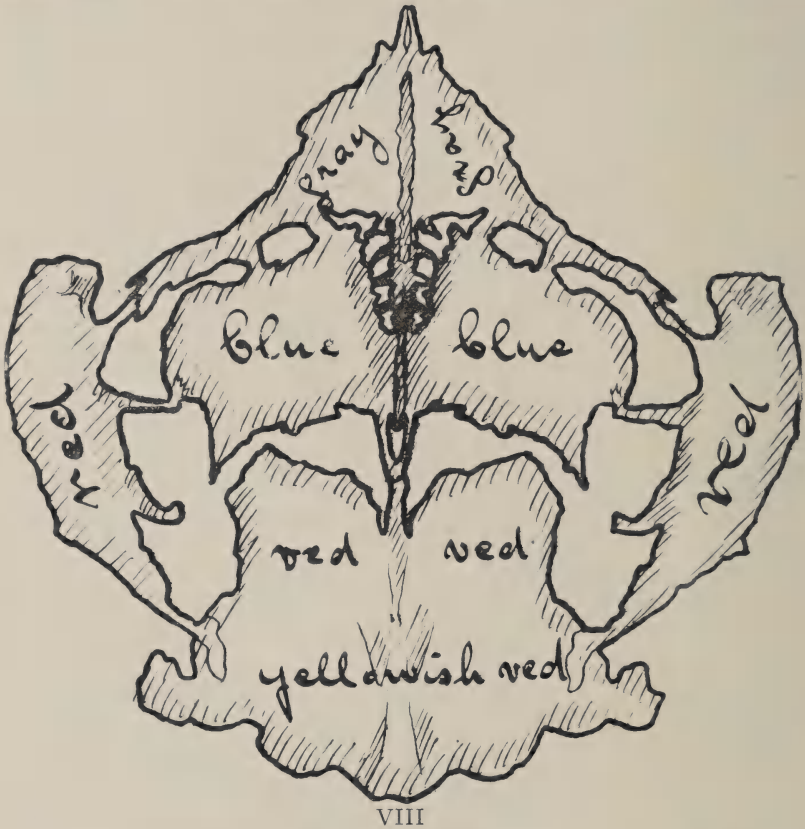
raphy, *O*, an apperception of small details. As a rule the brown figure is interpreted as a whole.

4. "Here is a fountain-like ascent of the middle branch": $DF + fountain$. Then came the explanation: "I don't know, but I don't see much," by which the patient gave expression once more to the association inhibition of the color-shock.

Picture X. A long hesitation on the part of the subject. Then:

1. "From a distance it looks like a colored collection of beetles": $GFFb + T$, one of those interpretations where it is difficult to decide whether the form, respectively the distribution of forms, was the

determining factor, or whether, in the first instance, the color determined the interpretation, the form playing merely a secondary part. It must not be forgotten that formulations of this kind cannot be rigidly classified, and that even with great experience and careful



consideration the subjective conclusion by analogy cannot be entirely evaded. In the interpretation as a "collection of beetles" it is even possible that the color did not play any part, and that the interpretation would have been the same if all the figures of the picture had been black instead of colored.

2. "Here we have polypi, but blue ones" (=blue at the side):
 $DF + T$.

3. "Here we have something like newts" (=gray at the side):
 $DF - T$.

4. "And here, standing up, two little animals with their feelers, as if they were standing on their hind-legs" (=gray above):
 $DF + T$.

5. "And the whole is again like a park road, the dark hue of the trees (=the shaded parts of the gray above), and in the middle a path stretching a long, long way": *DzwF(Fb)* + landscape *O*.

6. "That is like an arm of the sea" (=white between the lower halves of the red): *DzwF* — geography, an interpretation of the



IX

space-forms which, like the previous one, also takes into consideration the adjacent parts of the picture.

7. . . . "which breaks on a steep coast" (=red): *DF(Fb)* + geography.

8. "And this dark part here in the blue starred figure is a dwarf who is seizing the red with his arm and taking a step forwards": *DdB* + *MO*, a distinctly kinesthetic answer and, in fact, an apperception of small details which grasps only a part of the blue star-like

- V. $GF + T$. $DF + Md$.
 VI. $GF + TV$. $GF + T$.
 VII. $DF - anatomy$. $GF(Fb) + smoke$. $DF + TdV$. $DF + MdV$.
 VIII. $DF + TV$. $DF + anatomy$.
 IX. $DF + Td$. $DdF(Fb) + geography O$. $DF + fountain$.
 X. $GFFb(?) + T$. $DF + T$. $DF - T$. $DF + T$.
 $DzwF(Fb) + landscape O$. $DzwF - geography$. $DF(Fb) + geography$.
 $DdB + MO$. $DdF + TO$. $DF + Md$. $DF + T$.

By calculating these interpretations that could be formulated, *i.e.*, if we summarize the answers with the same type of apperception and those of the same quality, we obtain the following figures:

1. MANNER OF APPERCEPTION.

- G* 11, *i.e.*, an answer interpreting the picture as a whole was given eleven times. Such interpretations we may designate as a "whole" answer or a "whole" interpretation.
D 17, *i.e.*, answers concerning normal details were given seventeen times.
Dd 3, *i.e.*, small and unusual details of the picture were picked out three times, whereby we must emphasize the fact that several of the *D* replies are on the border of *Dd*. On the other hand, no absurd small detail was interpreted, as is characteristic of persons suffering from schizophrenia (dementia precox). There is consequently a distinct tendency to pick out unusual parts of the picture, but not absurd details.
Dzw 3, But none of these interpretations is that of a pure space-form, as the adjacent parts of the picture are utilized with them.

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2. QUALITY OF THE ANSWERS.

- F* 22, *i.e.*, of the 34 replies given to the ten pictures, 22 are interpretations of form, of which 5 are minus, *i.e.*, badly seen forms. This corresponds to *F* plus a percentage of 77. On the whole the number of *F* + is to be considered as rather a high one.
B 4, *i.e.*, four interpretations were determined kinesthetically. It must not be overlooked, however, that several other interpretations might possibly have been determined

kinesthetically as well, so that four (4) may be reckoned rather as too few than too many. Further, there is a tendency to small *B* and secondary *B* kinesthetic answers, the symptomatic value of which, however, has not yet been entirely clarified.⁷

- FFb* 1, *i.e.*, only one, and that a questionable *FFb* — interpretation—"Collection of beetles" (Pict. X) which, in the first instance takes into consideration the form, but is perhaps determined at the same time by the color.
- FbF* 1, *i.e.*, only a single interpretation: "Fire out of which smoke and flames arise" (Pict. II). This is determined in the first instance by the color of the picture without, however, leaving the form quite out of account.
- Fb* 0. But a tendency to such "primary" color-answers, in which the form of the picture has no share, is expressed in the last named interpretation.
- F(Fb)* 6, *i.e.*, six answers in which, not the color values, but the values of light and shade were the principal determinants.

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3. CONTENTS OF THE ANSWERS.

<i>M</i>	5
<i>Md</i>	3
<i>T</i>	11
<i>Td</i>	2
Anatomy	4
Fountain	1
Geography	3
Landscape	2
Smoke	2
Fire	1
	—
	34
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⁷ As *B kl.*=small *B* Rorschach designates, since the publication of his "Psycho-Diagnostic," the kinesthetically interpreted unusual smallest parts of the picture, thus differentiating them from the other *B* answers touching *G* or *D*. He was probably guided by the experience that, as a rule, only interpretations as a whole and the normal parts of the picture, the *D*, hint at kinesthetics. They are mostly not sensed at the same time, but are read or "felt" kinesthetically in a secondary manner into the picture. Sometimes they are purely fabulous ornamentations of the interpretation, and appear to point to love of story-telling and active "affectivity." Cf. Behn-Eschenburg, *Psychische Schüleruntersuchungen mit dem Formdeutversuch*. Inaug. Diss., Zürich, 1921.

M and T , respectively, Md and Td , denote interpretations naming human or animal shapes or parts thereof.

Of the proportional numbers which, as experience has shown, have proved of importance for the interpretation of the records and with which I shall operate in the present case in my subsequent remarks, we must mention (in addition to the $F +$ percentage already noted) :

1. The percentage of animals. This is 38, *i.e.*, 38 per cent of all the interpretations deal with animals or parts of animal figures.

2. The common or "vulgar" answers, *i.e.*, those interpretations given by one person in three. Here they make 21 per cent of the replies.

3. The original answers, which refer to rare interpretations, and occur at the most once in a 100 times. Of these there are also 21 per cent, but this number should be raised rather than lowered. This is likewise true of the vulgar answers.

Further, there are also some individual answers, *i.e.*, interpretations given by this particular subject alone. These are the fire and smoke interpretations of Picture II and the bowed figure in Picture IV, as well as the unformulated abstract interpretations: the line of power in the center, etc.

4. The type of apperception, which in the case of our subject is $G - D - (Dd - Dzw)$.

This formula is intended to express the rough proportion of the ways of apperception to one another. As a normal average, the formula of which is represented by $G - D$, we should obtain, with the same number of answers, about 8 G , 23 D , 2 Dd and 1 Dzw ; the number of G in the case in hand is proportionately too high; the number of D , on the other hand, is too low; that of the Dd and Dzw high. Consequently we must underline G and add Dd and Dzw in parenthesis.

The succession, the sequence of the modes of apperception in the interpretation given to each picture, is an orderly one, though perhaps somewhat loose. This implies that our subject is generally inclined to interpret G first of all, then D and then Dd , so that the modes of apperception have a certain logical sequence.

All the figures resulting from the calculations made on the basis of the record are by no means to be considered as absolute. We must always bear in mind a survey of the total record, so as not to trip over the figures for a single factor. On the other hand, the figures thus obtained form the basis of an interpretation, to which, in its totality, I have given the name of "psychogram," and I con-

sider it as being quite out of the question that, even with great practice and experience, a certain and trustworthy interpretation could be obtained from the experimental records alone, without calculation.

2. THE INTERPRETATION.

In view of the extraordinary variability of the experimental records there can be no fixed point from which factor a good and easy start can be made. In general, however, the surest start is that of the color-answers which—as has been demonstrated in a purely empirical manner—represent the “affectivity.” Yet a still more reliable path may perhaps be found in the unusual conduct of the single experimental factors, particularly in unusual correlations between the factors. Here there are several possibilities which might lead to a certain and rapid deduction. If the sharply apperceived forms are, for instance, 100 per cent, *i.e.*, if the forms are all carefully picked out sharply, and if there is a distinct tendency to *Do*, to pedantic, immaterial details, then it is fairly obvious that we are dealing with obsessional neurosis or depression. If there are a great many interpretations as a whole, such, in fact, as are combined out of normal *D* and, simultaneously, several *B*, then the subject is certainly a phantasy nature. But if the type of psychic reaction (*Erlebnistypus*)⁸ is “extratensive,” *i.e.*, if the color-answers considerably outweigh the *B* interpretations, and if, in addition, there is a high percentage of sharply apperceived forms, as well as a large percentage of animal interpretations, then it is pretty sure that we are dealing with an adaptable, smart, and up-to-date, but fairly stereotyped professional man. If the succession of the *G*, *D*, etc., is mostly “taut,” *i.e.*, when for each picture first of all a *G*, then some *D*, and then several *Dd* are interpreted with great regularity, the subject is sure to be a clever logician, but an unaccommodating programmatist, etc. Thus there are large numbers of correlations that can be rapidly grasped and permit of a comparatively easy settlement of the main lines of the psychogram. Where they are missing the task is not quite so easy, and it is in general more difficult to attack the record the more it approaches to the normal average and the more factors do we possess that move at middle heights. Too many “averages” make the record somewhat colorless.

The record with which we have to deal differs in more than one

⁸ With regard to the notion *Erlebnistypus*, for which there is no exact English equivalent, I refer to the conclusion of the following footnote, in which the terms “extratensive” and “introversive,” together with the experimental factors representing “extratensiveness” and “introversiveness” are likewise explained.

particular from mere medium values and, in addition, exhibits a phenomenon which soon leads to a certain clarity, viz., the hesitancy in the associative process on the appearance of the colored pictures, whereas previously, with the black pictures, the interpretations were much more prompt. This is the "color-shock."

The symptomatic value of the interpretations of color refers to the "affectivity." The *FFb* are the representatives of the adaptable affectivity, while the *FbF* and *Fb*, on the other hand, exhibit the egocentric, nonadapted affectivity. The mutual proportion of the color-answers among themselves leads to conclusions regarding the affective dynamics of the subject, to which the color-shock also belongs. It points with certainty to affect repressions of a neurotic nature, of which the repression of the colors as expressed in the color-shock is an indubitable sign.

But there are still other means of demonstrating the repression processes. If the colors are repressed, kinesthetic factors are mostly, and probably always, repressed as well, which, according to my previous researches, represent interiority, *i.e.*, introversion. The first picture has been so selected that, if the subject be in any way kinesthetically inclined, it can immediately be interpreted as *B*, and, in fact, with normal and unprejudiced subjects the interpretations of Picture I are kinesthetically aided and determined from the second or third answer onwards, if not already from the first. If the total record exhibits a fair amount of kinesthetic predisposition, and the subject, all the same, interprets the first picture without any *B* answer, then we may be sure that kinesthetic factors are being repressed. Our particular subject begins his kinesthetic interpretations only after the first picture, and in analogy to this we may establish the fact that even with the interpretations of the colored pictures, the actual color-answers likewise follow later, only with Picture X. It follows, therefore, that in these interpretations of the subject both color and kinesthetic factors are being partially repressed, and that both the kinesthetic, *i.e.*, "introversive," and the affective, *i.e.*, "extratensive," side of his type of psychic reaction are narrowed in (*koartiert*) owing to neurotic repression processes.⁹

⁹ With regard to the notions of "introversive" and "extratensive," cf. "Psycho-Diagnostic," pp. 72-75. As a superficial orientation I may state that Rorschach reserves the current terms of "introverted," respectively "introvertedness," for the state in which the subject is turned in on himself, and he calls the normal person with a strong excess of *B*, the representative of interiority and of living to oneself, *introversive*. Those with a big excess of *FbF* and *Fb*, who are more impelled to exteriority, with excitable motility and labile affectivity, he calls *extratensive*, in order to express the fact that we are not dealing with a fixed quality, but with a *mobile* potency, and that

And finally there is a third characteristic. Where there are no repressions the subject usually interprets motor and color answers mixed. This mingling of kinesthetic, form, and color interpretations appears to be the main characteristic of persons who are free from "complexes." This surely means that the normal dynamics of human experience (*Erleben*) cannot be simply expressed by the terms "introverted" and "extraverted," but rather that they consist in a to-and-fro, an oscillation between introversiveness and extratensiveness. This free play between introversiveness and extratensiveness is disturbed by the repression processes. Experimentally this is expressed in the following manner: A healthy person, if he is kinesthetically inclined, first (it is true) gives color interpretations when confronted with the color pictures, but he very soon returns to kinesthetic interpretations, and mostly in the fourth or fifth interpretation already, counting from Picture VIII, the first wholly colored one, he again apperceives kinesthetically. The repressed person, on the other hand, is quite fettered by the colors. In our record a *B* interpretation does not occur till the thirteenth time, and in this we again see a proof that with our subject the reciprocal action between the factors of interiority and those of the affectivity directed exteriorly is disturbed by neurotic repression—disturbance of the normal, free, and supple oscillation between introversion and extratension.

Obviously, then, we are not in presence of a psychosis, at least not a manifest one, because in psychosis there is never any color-

they are not opposed but different psychisms, the one being represented by kinesthesia, the other by color. "Introverted" would therefore signify the rigid excess of "introversive" tendencies over the nonintroversive, viz., the "extratensive" ones, and the corresponding terms of "introversiveness" (*introversivität*) and "extratensiveness" (*extratensivität*) would denote the capacity, and the terms "introversion" and "extratension" the process of turning towards oneself or turning to the outward world, viz., "to introvert" or "to extratend." The space between introversiveness and extratensiveness in the case given is the type of psychic reaction (*Erlebnistypus*). Rorschach calls it constricted (*koartiert*) if the *B* and *Fb* values approach zero, and dilated or extended if a great measure of both introversive and extratensive capacities is present. On page 78 of his "Psycho-Diagnostic" Rorschach thus writes about *Erlebnistypus*: "If we know (from the absolute number of the *B* answers) the strength of the introversive factors of the subject under experiment, the strength of his extratensive factors (from the number of *Fb* answers), the proportions of the introversive to the extratensive ones, and in how far introversive and extratensive factors are constricted or dilated (from the number of the *B* and *Fb*, together with a few other factors), then we know a great deal about the subject. We do not know what he experiences (*erlebt*), but how he experiences it. We know a great many of the qualities and dispositions, both of an associative as well as of an affective and of a mixed nature, with which the subject stands in life. We do not know his experiences (*Erlebnisse*), but his experience apparatus with which he receives the experiences from within and without, and with which he subjects the experiences to the first elaboration."

shock. This conclusion, namely, that we are dealing with a neurotic, can be carried further. Our subject has 4 *B*: $1\frac{1}{2}$ *Fb*.¹⁰ This would be the formula of his type of psychic reaction. Hence the *B* outweigh the colors, even if we do not cling fixedly to the numbers in question. The enumeration showed already, as we saw, that among the answers designated by *F* there were more to be found which might have been at the same time kinesthetically determined than those which might have been determined by colors. In other words, the inclination towards kinesthetic interpretations is distinctly stronger than that towards color interpretations. Hence the type of psychic reaction is more introversive than extratensive, or, to express it more correctly, if we recollect the already established repression processes: The introversive factors of the type of psychic reaction have opposed more resistance to the repression than have the extratensive ones; the coarctation or constriction has hit the extratensive factors harder than the introversive ones.

According to my experience the facts with regard to neuroses are on the whole as follows: In the case of more extratensive types of psychic reaction hysterical symptoms predominate, and when there is more introversion the neurasthenic and psychasthenic ones; and the more the type of psychic reaction approaches ambi-equivalency, *i.e.*, the nearer the number of the motor and color answers approach each other, the more do obsessional phenomena mingle with the neurotic picture. The pronounced obsessional neurotic stands midway between the hysterical and the psychasthenic patient. Hence we might expect with our man psychasthenic rather than neurasthenic symptoms, with a probability of obsessive phenomena, as this type is not very far removed from ambi-equivalence. Consequently we should have inferred neurosis from the color shock, and the particular form of neurosis from the type of psychic reaction, the psychasthenia with obsessive phenomena.

Let us now return to the result of the calculations. The proportions of the affectivity are at first somewhat obscure. The *FFb* with (*Fb*) predominate, *i.e.*, those interpretations which are determined by light and shade values and not by actual color values. The symptomatic value of these interpretations is not yet fully explained. They appear to have something to do with the capacity of adaptation in the affectivity, but also point to an anxious, cautious, and unfree kind of

¹⁰ Rorschach was right in confronting the unit *B* with the unit *FbF*, which he considers also theoretically justified, as both with *B* and *FbF* the form is taken into account together with the movements and the color. Further, the *FFb* were calculated as half, the primary *Fb* as one and one-half units. "Psycho-Diagnostic," p. 24.

affective adaptability, to the will to master oneself, and especially to an inclination towards a depressive fundamental disposition (*Grundstimmung*), which one tries to master in the presence of others. On the other hand we have at least one interpretation which betrays a powerful egocentric affectivity. This is first of all the color interpretations—smoke and fire (Pict. II). If the first color interpretation is the most egocentric and is followed by undecided color-answers, as in this case, this speaks principally in favor of an affectivity which, on the whole, is violent and impulsive, but all the same subject to mastery. Consequently we are here dealing with conscious rather than with unconscious repressions, and less with actual repressions than with a conscious struggle against one's own affects. Hence, for the time being, we can only infer from the color-answers that there are two contrary tendencies in the affectivity of our subject: (1) a depressive one, exteriorly mastered and somewhat anxiously adapted, and (2) an impulsive-egocentric one which is checked, as far as possible, not only exteriorly but also interiorly.

The color-answers do not carry us any further for the moment, so that we must now again start from other factors. Such a further starting point is the question of the intellectual capacity of adaptation, and the relation (*Rapportfähigkeit*), for which a solution can be sought in numerous factors.

In the first place are manner of apperception and succession. The type of apperception is that of a man who neither loses himself too much in immaterial details (*Dd*) nor spasmodically makes for total apperceptions, although the whole record distinctly shows that he tries first of all to give "whole" answers (*G*) to each picture before going over to *D*. The succession is in itself an orderly one without being too closely drawn, that is to say, there is no incoherence or programmatic stiffness in his methods of thinking. It is, rather, on the whole, the thinking of common sense which is capable of adapting itself to the task in hand, with a comparatively good sense for primary and secondary matters. A closer inspection shows, however, that the succession exhibits an individual peculiarity, apart from the already mentioned fact that the numbers for *G* and *Dd* are somewhat too high, and that for *D* is somewhat too low. I shall return to this later.

In Picture I our subject first gives a "whole" answer, then turns to the center of the picture, interprets the skeleton, and finally returns to a "whole" interpretation, viz., a flying being with its body lying in the center line. With the second picture we get first of all a "whole" answer, then his eyes again turn to the middle, where a

landscape is interpreted. Then, following closely on this, once more starting from a medial part of the picture, the patient gives a "whole" interpretation for the second time, the fire with the column of smoke and the flames striking out above. In the third picture we have again a *G* first of all, with a repetition of the penetration to the center, which gives rise to the interpretation: "as if the red thing in the middle were a force separating the two figures or not letting them meet." This procedure, first *G* and then details in the middle of the picture, and then a second "whole" answer arising from a medial part of the picture, a *G*, or an interpretation *DG* built up of several *D*, goes through the whole experiment. In this there is certainly a kind of programmatism of the thinking process.

Here several things are to be observed. Firstly, the succession in itself, which obviously gives an insight into the way in which the subject apperceives and masters any new situation. First of all a broad reconnoitering glance, then a riveting of the eye on the center detail, and after that a development of the whole from this center detail, a constructive elaboration. The first *G*, the reconnoitering ones, are mostly of an abstract nature. They are notions which do not inspire the subject himself with too much confidence, and, indeed, the interpretations first given to each picture are neither original nor (in part) sharply apperceived. On the other hand, the later interpretations of each picture have nearly all something constructive. Uncertain, "unsharp," and unequal as are the first abstract interpretations, so sure, equal, and convincing are these constructive ones. We can conclude from this that the patient can think better inductively than deductively, more synthetically than analytically, is more concrete than abstract, more constructive than disintegrating. The fact that all the same the first interpretation is an abstract one leads us further to conclude that the subject certainly attempts in every situation to obtain a survey of the whole by a rapid reconnoitering glance, but that he is hardly satisfied with this and does not feel at his ease until he can proceed to the details and to a construction arising out of these.

The succession further tells us that the subject rivets his attention on details, but not on those details that are chiefly in evidence owing to the structure of the picture. He leaves out of count a whole series of easily interpreted normal *D*, especially the lateral ones, and concentrates himself always on the center of the picture. Even when he cannot interpret anything concrete he interprets round about the center. If we survey the contents of these interpretations we find among them all those interpretations that cannot be cata-

logued: the force on which everything hangs; that keeps the two figures apart; the fire and smoke columns—all constructed from a medial detail. Here, too, there is a certain programmatic kind of thinking, an abstractive tendency in spite of the prevalence of concrete-mindedness. This must have its psychical determinants somewhere or other, as it cannot blind us to the fact that the constructive brain processes lie closer to the subject than do the abstractive ones; and as it is seen to be in general a phenomenon determined by a complex when interpretations are given in the form of *abstracta*, and which, in addition, are here always induced by the center line. The individual peculiarity of the succession with our subject seems therefore to be determined by complexes, and it would almost appear that a more or less obsessive overlading of the abstract thinking processes were present, as opposed to the actual and natural disposition, which is more concrete than abstract, more constructive than abstractive.

(*To be continued*)

SOME PHASIC AND PERMANENT MUTATIONS IN CERTAIN ENCEPHALITIC SYNDROMES *

BY DR. ISADOR ABRAHAMSON AND DR. A. N. RABINER

The motor manifestations of lethargic encephalitis seem intended to reveal to us the workings of the spirit of the movement. But patients are poor mediums. And with the distinguished exception of Sir Arthur Conan Doyle, we, as a profession, are skeptical of things of the spirit. But in the hope of stimulating some investigation, I shall briefly recount and discuss a few of the phenomena of movement that, in common with others, I have observed in lethargic encephalitis.

One might truthfully assert that in no two cases of lethargic encephalitis are the motor phenomena identical. And only less marked than the individual variations are the variations in the individual. Such variations in a particular case may occur without any detectable change, but merely in its motor manifestations. One of the patients, A. P., aged eleven years, had a Parkinsonian gait and posture with a right hemiparesis. She was so rigid that she was confined to bed, for she could not walk about. The rigidity included not merely the trunk but also her face. Her speech was slow and monotonous, her eating deliberate and difficult. And so she was all day, but at night she would get out of bed, wander around the ward, eat greedily, and laugh and chatter with the other patients.

The peace of the night brought freedom to the spirit of movement of this little girl, and the bustle of the day locked her again in her rigid cell. Edith O., aged twenty, behaved similarly. During the day she was rigid, immobile, and could not feed herself. At night she became entirely relaxed, could walk about with ease, and sometimes dance. But in half an hour her freedom waned, she began to get rigid again, and returned to bed. If she slept during the day she sometimes, on waking, could walk freely, even before night came.

The peace of the night, or temporary escape from the day, through sleep, had the power suddenly to free the whole musculature of these girls from rigidity. Just as suddenly and completely the amiable wish to entertain by a display of his prowess used to free S. S., aged seventeen, from his rigid coat of muscles. S. was so rigid

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that in attempting to walk he toppled and crashed down like a statue falling from a pedestal. Yet at times, when visitors came, he roused himself to throw away the mask from his face and to doff the rigidity that encased his body like armor, that he might entertain his friends with Russian dances, dances that called for great agility, rapidity of movement, and suppleness.

Like S. S. was A. K., aged sixteen, who came to Montefiore Hospital with a Parkinson syndrome of two years' duration, following encephalitis. As a rule his face was a mask, and he had the typical tremor, gait, and posture. But frequently he would emerge suddenly from his rigidity and celebrate his release by running along the hospital corridors. At these times his speech ceased to be slow and monotonous and his tremor was absent.

In these four cases perfect voluntary movement was possible, and was frequently demonstrated. Structural changes do not from hour to hour, from day to day, appear and disappear, and appear again, affecting the musculature as a whole. Yet these persons become suddenly or gradually, completely or partially rigid; and as suddenly and completely lose their rigidity.

Obviously, if the disease produced any lesions in the upper and lower motor neurons these lesions were compatible with perfect freedom of movement. The seat of the disturbance in these cases was, therefore, at some level, above the Rolandic area, the depot for the departure of all the cerebral motor impulses.

There was little evidence of mental disturbance in these cases, and the mood rather than the mentality varied with the motor changes. But in no case was the mental change comparable with the motor. The apparent disability affected not the thought processes but the materialization of the thoughts in movement.

The speed of association is incomparably greater than the speed of reproduction. At a given moment, out of the welter of motor images which thought evokes, one normally is dominant. The dominant motor image normally excites impulses which ultimately lead to plastic alterations in muscle tone, which reproduce the dominant image, and while this alternation is happening the succeeding dominant image awaits, in its turn, expression.

The dominance which insures reproduction of the motor image may be due to that image being the resultant of the existing motor images, or to its intrinsic strength, or fortuitously to the absence of competing images. The strength or affect of the dominant image must be such as to overcome the prevailing muscle tone to impress the musculature with the tone change that reproduces the image

itself. The youth who danced for his visitors was made free from his rigidity by a dominant desire, and he remained free till the desire waned and fatigue grew. The girls who walked in the peace of the night had the desire to walk, made dominant by the absence of competing desires of the day. She who could walk when refreshed from a day sleep became rigid again when she used up that increment of strength, and in the night she walked at ease only for half an hour, when the affective strength being exhausted, her motor images ceased to be able to prevail over the tendency to rigidity.

In these cases, the hour, the occasion, or other circumstances tended to increase the motor affect, but the completeness and the suddenness of the temporary disappearance of the rigidity suggested that the motor image acted upon a central region of muscle tone which was interposed between the sphere of the associations and the Rolandic area. This suggestion was strengthened by the case of one L. W., aged thirty-eight, an advanced Parkinson, with typical facies, gait, and speech, a drooling creature with a history of two years' duration, Wassermann 4 plus. A dose of salvarsan caused all the symptoms to disappear in a few days. We were here dealing with a lesion profoundly affecting muscular tone, and little else. A function thus selectively affected must be definitely localized. And as if to raise the probability of a central organ of muscle tone to a height of a certainty, there came to me a man, K., who within the course of seventeen days showed an acute affection of his central organ of muscle tone, which almost caused his death, and then completely disappeared. When I first saw him he showed a marked Parkinsonian syndrome of ten days' duration, and he had rhythmical movement of the fingers and toes, with marked rigidity. His jaws became set, he had increasing difficulty in protruding the tongue, dysphagia, and dysphonia. His breathing began to be labored, and in sleep, at times, it was of Cheyne Stokes character. He was fed per rectum and was given subcutaneous glucose injections. A week later he began to improve, his rigidity rapidly vanished, he became confused and euphoric, his bulbar symptoms disappeared, he rose from bed, felt fine, he wanted exercise, and so forth.

This central organ of muscle tone is tuned to respond to the effect of the motor image. In it there is no question of association of images. If an image has the necessary affect, the organ responds by a tone change of an appropriate character, to lead to the externalization of the image. If the necessary affect is lacking the image is there blocked and does not find outward expression.

Hence, we notice in these cases profound changes in rigidity,

dependent upon changes not in associative activity but in what we may style associative set or mood. The little girl inverted her day, and E. O. also was a night walker. The one boy danced and the other ran when the affective state, the mood, was favorable to affective intensity. This activity passed with the favorable affective circumstance, not to return till the conditions were again propitious. K. became strong and agile when he became euphoric.

It is interesting to note that if an associative set be induced the rigidity can in definitely remarkable measure be overcome. Thus, in those with much speech difficulty, if we coax them to say serial numbers, numbers whose habitual association is fixed by the mordant action of years of practice, the speech difficulty progressively diminishes as the repetition of the numbers goes on. And in ambulant cases we make them practice walking by command, right, left, right, left . . . the gait quickly improves during the drill. Here again we have instituted a motor set, relieving the patient of the necessity of choice and freeing the available affect for motor reproduction.

It is interesting further to note the tendency of the motor affect in these rigid cases to produce an exaggerated, spreading, and persisting response. This overloading of the motor reproduction with tone affect leads the quiescent rigid Parkinson case occasionally into a turmoil of tremor when he achieves a motor reproduction. But I would again emphasize that this result arises not much from disorder in the sphere of the motor associations; it occurs outside the conceptual sphere, below the level where motor images originate, are facilitated, and are suppressed. It occurs in the mechanism concerned with reproduction, with externalization; it occurs in what I have styled the central organ of muscle tone.

Doubtless the motor images are not facilitated and suppressed normally. But the chief trouble lies in the central organ of muscle tone, where the affect is, so to speak, divorced from the blocked motor images, producing not the particularly desired motor action, but serving merely to cause a general rise in the tone of the voluntary muscles. Analogously, in the sensory field, we see in the optic thalamus the central organ of sensory tone, lesions producing emotional exaggerations.

In sleep, when thought is suspended and motor images are not longer cumulating the affect of balked expression, the rigidity disappears.

In this central organ of muscle tone the musculature is represented as a whole. This is perhaps what, *a priori*, one would expect since all movement is but a phasic alteration in a single organ of

expression, the musculature. But there is in the following case a hint of both the existence of a bilateral representation of this central organ of the whole musculature and of the localization of these central organs of muscle tone on either side in close proximity to the hemilateral centralization of the sensory field. In 1918, M. R. had typical encephalitis with diplopia and choreiform movements. January 26, 1923, she was admitted to hospital suffering from violent choreiform movements, with retention of urine and cystitis. These movements were involuntary, bilateral, but neither rhythmic nor synchronous. But certain movements were much more prevalent than others; for example, inward rotation of both arms with aversion of the hands and inward rotation of both thighs with talipes equinovarus. Such was her state when on March 6, 1923, following a supposed slight, she suddenly grew drowsy. On being aroused she gave irrelevant answers, and in this seeming sleep she tossed and writhed and twitched. A distinct weakness of the muscles of the neck and eyelids was detectable, but her superficial and deep reflexes were normal. That day all the movements ceased, the patient lay stuporous, left hemianalgesia was present, including the face but excluding the mucous membranes. During the next day the stupor disappeared and the movements returned, but the hemianalgesia persisted for a time.

In this central organ of muscle tone, as we see from the preceding case, the muscles are represented in synergic groups, and these groups are often strangely different from those that are usually associated in normal movement. In Miss M. R., aged twenty-nine, a nurse, movements of the lower and upper limbs very similar to those just described were present. She came to hospital in August, 1922, and the movements persisted until the end of September. Then they disappeared and she was able to take up again her work as a nurse. But she received a severe mental shock and returned to us as a patient on December 3, 1922, showing precisely the same motor phenomena as on her first admission. In the quiescent interval we must assume that the affective state was adequate to mask the specific and definitely localized lesion of the central organ of muscle tone. When the affective state fell below a given level the motor signs appeared; when it rose above that level they disappeared; and when it again fell below the level of affective control the motor manifestations peculiar to her lesion reappeared.

Such cases where the motor manifestations have disappeared for weeks and months, only to return in their former type, are not rare. They can be explained only on the basis of a lesion of a central organ

of muscle tone. What we see externalized is the action of the lethargic mental state upon a diseased central organ of tone. That mental state is characterized perhaps chiefly by the disturbance of the affective element of thought, rather than by disturbance of the associative processes. It is, as I have said, more a matter of mood than of mentality, and into its nature I shall sometime ask you to enter more fully with me. But besides this affective defect, the level at which the reproduction of motor images begins is also affected. It may, as we have seen, be affected suddenly or gradually, completely or partially; but in every case the whole musculature is implicated, for there seem to be a right and a left central organ of muscular tone, in each of which the whole musculature is represented in synergic groupings. This organ lies near the central station for sensory impression of one-half of the body. The affection of both the central sensory and motor organ seems sometimes to occur simultaneously, giving rise in part to the accompanying state of semiconsciousness which is closely akin to what we call hysteria. The localization and precise boundaries of this central organ of muscle tone I may be permitted to leave to other investigators. I meant, if time had permitted, to call attention to other motor manifestations, but my purpose to-day will be amply achieved if you have been interested in the workings of one of the most integrated aspects of movement, as revealed by lethargic encephalitis.

Case of M. R., eighteen years of age. Family history negative. Influenza in 1918, followed by choreiform movements and diplopia on occasions, and headaches. Chorea two years ago. Diplopia also during present attack of chorea.

Entered the hospital January 26, 1923.

Violent choreiform movements; then a retention of urine with secondary cystitis, catheterization necessary; very excitable, irritable, quarrelsome, touchy.

The movements of the patient are involuntary, bilateral, not rhythmic, not synchronous; while affecting similar muscles on both sides, the order of involvement is bizarre for the most part, but certain muscular movements predominate; inward rotation of both arms with the eversion of the palm, and inward rotation of the thighs with talipes equino varus positions of the feet. The movements bear only a superficial resemblance to chorea. There was slight improvement for a time of the bladder condition.

On March 6, following a supposed slight which grieved her very much, a marked change occurred in her condition. She became increasingly drowsy, and when aroused gave irrelevant answers; in the apparent sleep she is restless, tossing about and with an increase of the twitchings, a distinct weakness of the muscles of the neck, a drooping of the lids; all her superficial and deep reflexes are normal;

now and then she cries out, "My head!" Rest of status as before; refused nourishment. That day all the movements ceased and the patient lay as if in a stupor; when observed in the evening only an occasional and rare movement, and then only in the peripheral parts, was to be seen.

The summary of the examination then showed: (1) Stupor; (2) cessation of the movements; (3) hemianalgesia sinistra, including the face, but mucous membranes, genital and anal areas spared; (4) with considerable rousing and prodding a few responses were obtainable.

The next day the stupor began to clear up; with it the movements returned slowly, reaching their previous amplitude; the hemianalgesia persisted for quite a time.

The disputes with the nurses again set in; threatened suicide, and was sent home, condition unchanged except for the improved condition of the bladder.

Case of K—. A case of lethargic encephalitis with the development within ten days of a marked Parkinsonian syndrome, equal rhythmical movements in the fingers and toes; nystagmus; unequal, irregular, rigid pupils; extreme rigidity and cogwheel phenomenon in the upper extremities yielding slowly to the increasing rigidity; marked impairment of the associated movements; insomnia; flexion of the knees, ankles; plantar flexion of all the toes; cogwheel eye movements; jaws becoming set; increasing difficulty of protruding the tongue, and increasing dysphagia and dysphonia; sensorium clear; abdominal reflexes lost; equal right sided Babinski; equal tremor, marked in the toes, each one exhibiting its own movement, differing in time, etc., from the others.

One week later, nystagmus in all directions; stiff, irregular pupils; jaws closed; tongue cannot be moved; inability to swallow or to phonate; extreme Parkinson rigidity and helplessness; mild lethargy; extremely greasy skin; the patient cannot move any parts of any extremity or move his face or jaws; breathing beginning to be labored; at times in sleep Cheyne-Stokes; rectal feeding; subcutaneous glucose injections; temperature 100.

For a few days his condition appeared very critical, then he began to loosen up, and became confused; euphoric, began to open his mouth, protrude his tongue; then, very much excited, got up from bed, walked about; was kept in bed with great difficulty; he felt fine, wonderful; there was nothing wrong with him; all he needed was exercise. This within the space of four days; very little of the Parkinson syndrome, the dysphagia, dysarthria, tremor, cogwheel, were in evidence; the patient, in an excited mental state, combined with euphoria and garrulousness, kept a constant flow of conversation, showed great motor unrest, flight of ideas, etc.

The physical signs disappeared, never returned; the pupils were unchanged; the nystagmus was still present; the greasy skin, the polyuria and polydipsia persisted for a time. In short, a patient almost *in extremis* from Parkinson-bulbar symptoms in less than a week's time loses most of his symptoms, except a few residues.

A—— K——, age sixteen; born U. S. Admitted July 16, 1922; discharged October 17, 1922. F. H.: Of no importance. P. H.: Essentially negative. P. I.: Gradual onset two years ago. No associated or preceded fever or diplopia. People called attention to his peculiar gait; his knees were bent in walking. About three days later noticed that his extremities "shivered." His condition became gradually worse; he was sent to the hospital, where his condition was recognized as that of a Parkinsonian syndrome following encephalitis. As a rule his face was masked; there was the typical gait and posture of the disease, with tremor, loss of associated movements, festination, retro- and antero-pulsion, and marked rigidity. But it was noted that he frequently came out of his condition. He could run up and down the length of the corridor with great rapidity, straightening out the body with normal associated movements; the speech, which as a rule was slow and monotonous, became brisk and normal, and even the tremor could be stopped. For this reason he was considered functional for a time by some observers.

Urine and serology negative. B. P. 140/70.

I—— L——, age thirty-eight; truckman; Russian. F. H.: Negative. P. H.: Negative except for acquisition of a chancre at age of twenty-nine years, for which he was actively treated for one year with no apparent sequelae. P. I.: In January, 1920, while driving his truck, developed severe frontal headache and saw double. He was taken home and soon went into a lethargic state, in which he stayed for six weeks. He could be aroused and fed, then lapsed back into stupor. He afterwards was weak, but soon regained sufficient strength to go back to work. He worked this way for 1½ years, except that he tired easily. He then developed difficulty in chewing food, drooling of saliva, and a slowly progressing rigidity of the body, so that he could no longer work. P. E.: On admission, facies, gait, and speech typical of advanced Parkinson; marked drooling of saliva; pupils unequal, left more than right, react sluggishly, converge well; fundi, hazy discs, vessels normal, right internal rectus weakness, with facial flatness; tongue tremulous; marked hypertonias in all extremities; deep reflexes all hyperactive; tendency to irregular clonus, both ankles; no Babinski.

Patient was extremely helpless on admission; was so rigid that he could not feed himself; gait very markedly *en masse*, and in a state of extreme flexion. There was so much salivary drooling that his clothes were badly soiled, and a hospital uniform such as usually given to untidy patients was provided for him. Because of his positive blood and spinal fluid serology he was given a dose of salvarsan. In a few days there occurred a tremendous change. He assumed an upright position; there was a definite release of rigidity, so that he aided in lifting patients out of bed; he fed himself; salivary drooling ceased; he now dressed himself, and his gait and posture assumed normal proportions. Urine, negative. Wassermann (blood), 4 plus. Spinal fluid, marked pressure, clear, globulin and Fehlings, negative. Wassermann, 4 plus. Colloidal gold, 224421000. Blood chemistry: Urea nit., 16.9; uric ac., 3.3; sugar, 113.

J— O—, age twenty-seven years; single; salesman; born U. S. Admitted July 27, 1922; discharged November 5, 1922. F. H.: Irrelevant. P. H.: practiced masturbation for many years.

P. I.: January, 1921, developed a tired out feeling, which lasted several days. Then diplopia occurred, for which glasses were prescribed. Later he would fall asleep when at work, but at no time was there lethargy for a continued period, or any associated fever. In September, 1921, noticed restlessness, and that he frequently found himself forced to stand up and perform exercises. He then noticed frequency of respiratory movements. For this a throat operation was performed.

P. E.: Station and gait normal except for slight loss of normal associated movements in the upper extremities. Right pupil somewhat larger than the left. React well to light and accommodation. Otherwise physical examination is negative except for respiratory disorder. This consists of rapid forced inspiratory and expiratory acts and then holds his breath for about one-half minute. Then the rapid respiration is repeated. At times he suddenly rises from his seat and begins to breathe, as noted. This condition is not present during sleep, and as a rule ceases at night.

Urine and serology, negative. Blood pressure: systolic, 96; diastolic, 75. Note: This patient afterwards was at Mt. Sinai, where his back was cauterized for psychic effect, with no improvement. He eventually landed in the Manhattan State Hospital.

M— R—, aged twenty-seven years; nurse; single; born England. F. H.: Of no importance except that one brother was killed in action during the recent war. P. H.: Except for abdominal operation, one for appendix, eight years ago, and one for a right-sided pelvic abscess, four years later, is negative.

P. I.: In August there is said to have been an indiscretion in diet, following which there was headache for several days and insomnia. This was succeeded after several days by attacks of peculiar movements, described as "hands in position of accoucheur (tetany) with equino varus in the lower extremities." There was a questionable left ptosis, active abdominals, and no Babinski. These attacks of spasmodic contractions in the extremities continued from August 22nd to September 9th, when she went home against the advice of the hospital authorities. Repeated blood examinations for calcium, chlorides, cholesterol, CO₂ tension, blood counts, urine examinations, showed no abnormalities. She recovered after a time at home and returned to duty. She then again developed her spasmodic attacks, this time after some psychic (?) trauma, and was readmitted to the hospital December 3, 1922. Examination showed: pupils slightly irregular; react normally. Ocular movements O.K. Jaw jerks very lively. Bilateral ptosis, especially left. Tendon reflexes in uppers normal. Abdominals elicited. Knee jerks positive; ankle jerks diminished. Strong adduction of shoulders in which the pectorals predominate. Latismus does not participate in this action. Strong hyperextension of elbows. Hyperpronation and eversion at the

wrists, with alternating flexion and extension movements of the fingers. Flexor movements of the thighs in which the psoas does not take part. Strong adductor spasms of the thighs with the adductors contracting strongly. Inversion of the feet, with bilateral pes equino varus. Marked hypotonia, right more than left. No sensory disturbances. Doubtful Babinski on right side. The blood chemistry was again thoroughly studied and no abnormalities found. Patient left the hospital and went home, where there is said to have been considerable improvement. Is now working, nursing at the Polyclinic Hospital, New York City.

E—O—, age twenty years; stenographer; single; born U. S. F. H.: Irrelevant as to present condition. P. H.: Of no significance.

P. I.: In January, 1920, while at work, complained of feeling tired and vertigo. Was taken home, put to bed, and condition called influenza. After a few days became drowsy and sleepy. At this time there was inability to sleep during the night. Diplopia at this time, and fever, for two weeks. She remained at home for seven months and then returned to work. She noticed, however, that she would fall asleep while at work. Salivation was also noticed at this time. Her somnolence led to her discharge five months later. In April, 1922, she was knocked down by a taxi cab, and since then her condition has become worse. Patient volunteers the information that during the day she is rigid and must be fed, but at night feels entirely relaxed, can walk about with ease and can dance. After about one-half hour she returns to bed, and is again rigid. She states that if she sleeps well during the day she can do this at times in the daytime.

P. E.: At times is emotional. Right pupil larger than left; outline irregular; react sluggishly to light; cogwheel in eye movements; fundi negative. Marked facies; seborrhea present; tongue tremulous, protruded slowly. Jaw jerks lively. Cranial nerves otherwise normal. Upper extremities show vasomotor involvement, cogwheel involvement, loss of normal associated movements. Tendon reflexes active, coarse, rhythmic. Tremor present, more marked on volition; abdominals lively. Lower extremities: motor power good, cyanosis and cold distal parts, Babinski left side. Tendon reflexes hyperactive, equal both sides. Pes equino varus tendency.

Urine, negative. Spinal fluid: Clear, normal pressure, no cells, globulin or sugar; Wassermann, negative; colloidal gold, 001010000. Blood: Wassermann, negative. Chemistry: Urea nit., 7.1 mg. per 100 c.c.; uric acid, 2.3 mg. per 100 c.c.; sugar, 106. mg. per 100 c.c. Blood pressure: Systolic, 105; diastolic, 70.

S—S—, age seventeen years; Russian. F. H.: Irrelevant. P. H.: Irrelevant.

P. I.: There is said to have been a febrile attack in 1920, which lasted three weeks, with restlessness and delirium. For three days there was a comatose state associated with involuntary movements of the extremities. There were then no unusual symptoms until December, 1921, when there occurred tremor of the left upper and lower limbs. This progressed and developed into a rigidity of the entire

body, extremities and trunk, making unaided walking an impossibility. Diplopia present during febrile attack.

P. E.: Gait is rigid, "*en masse*." In walking thrusts the left shoulder forward and falls *en masse*, the entire body falling as if petrified. Face masked; bilateral facial flatness; normal association of eye movements disturbed; pupils react sluggishly; sialorrhea present; tendon reflexes active; bilateral cogwheel, more on left; abdominals were lively; no Babinski.

Of interest is the fact that at times, when in the company of others, he seems to rouse himself from the appearance of the subacute stage, and on several occasions has danced Russian dances requiring considerable agility, rapidity of movement, and looseness of trunkal and axial appendicular movements. Mentally seems dulled, but when called for, all faculties are normal, and mental examination shows no involvement.

Urine, negative. Blood pressure: Systolic, 110; diastolic, 66. Lumbar puncture: Pressure, normal; clear, four cells; globulin and Fehlings, negative; Wassermann, negative; colloidal gold, 0111110000. Blood Wassermann, negative.

A—— P——, age eleven years; school; born U. S. F. H.: Parents and other child alive and well. No other children, no miscarriages or other factors of interest in family. P. H.: Second born; birth normal. Usual diseases of childhood. Influenza during 1918 epidemic, for two weeks; no complications.

P. I.: Onset February, 1920. Continuous movements of the extremities were noted during the afternoon. No fever at this time. That night slept very little, and movements ceased during sleep. The next day some movements were still present, and that night was better. The third day there was fever, 104, and diplopia. She then became drowsy, the movements ceased, and she then went into a lethargic state. This persisted for six weeks, but there was no temperature after the second week. She then developed Parkinsonian gait and posture, with tendency to right hemiplegic type. The rigidity became so marked that she could not walk about and was confined to bed. The rigidity included the face, speech slow and monotonous, and eating slow and difficult. The mother states that the child was rigid all day, and at night would get out of bed, wander about the house, and eat by herself.

P. E.: Small female child; in bed; the entire body and extremities are rigid; no movements voluntarily. The child cannot feed herself. Holds head rigidly on trunk, with eyes turned, as a rule, to the left. Pupils are sluggish in their reactions. Fundi negative. Other cranial nerves normal. Deep reflexes are lively, right more than left; abdominal lively, no Babinski; bilateral ankle clonus, left more than right; a constant coarse tremor present at times in both upper extremities. Bilateral cogwheel present.

The interesting feature of this case is the difference between her condition during the day and night. All day she lies in bed totally rigid; does not move a limb or even an eyeball. Feeding is a laborious

process, taking several hours, during which a nurse must place the food in small portions in the mouth. The food must be watched, as she often gags; the particles of food slip into the pharynx. She rarely smiles and never sleeps. At night she throws the bedclothes off, gets out of bed unaided, walks about the ward, speaks to the children in a normal voice, laughs, obtains food, which she eats, and in general shows no presence of rigidity as during the day. When placed in a dark room during the day she does not deviate from the rigidity present.

Urine, negative. Blood, Wassermann, negative. Spinal fluid: Wassermann, negative; moderate pressure, clear; globulin negative; Fehlings negative; three cells. Blood pressure: Systolic, 106; diastolic, 64.

POST ENCEPHALITICS

Twenty Cases Studied

Types:

Rigid	Tremulous	Rigid and Psychotic	Rigid and Tremulous
15	0	1	4

Speech defects: All.

Other bulbo-pontine involvement:

Ocular	Salivation	Decerebrate postures	Deglutition
18	14	6	1

Cataleptic:

3	1
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Ability to initiate acts:

Time of initiation:	6 seconds	3 seconds	2 seconds	instantly
	1	8	10	1

Running upstairs well: 14

Occupational therapy work: 4

Typewriting: 1

Picking up objects from the floor: 16

All can do arithmetical problems well, but with slight time of initiation. No definite fatigue noted.

<i>Dystonias</i>	<i>Encephalitis vs. Originals</i>	
Ability to get around:	None	2 (only slight)
Duration:	3 cases, 3 yrs.	1, 9 yrs.
		1, 4 yrs.
		1, infancy, 16 yrs.
Remissions and exacerbations:	None, progressive	Very slight
Skilled acts: Possible by those, only, not encephalitis. P——		
F——, the worst, has done some excellent hand work.		

PROGRESSIVE MUSCULAR ATROPHY, WITH REPORT OF TWO CASES OF THE NEURAL TYPE

By EDWARD NOVAK, A.B., M.D.

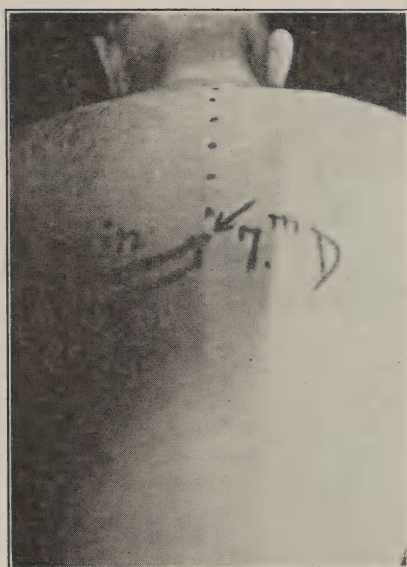
BALTIMORE

INTRODUCTION

The disease picture now recognized as progressive neural muscular atrophy, peroneal type of Charcot, Marie and Tooth, belongs to a group of affections which probably are more or less intimately related. Jelliffe and White (1) give to the entire group the appellation of primary progressive muscular atrophies; the word "primary" apparently aiming to exclude conditions in which muscular atrophy ensues as a result of inflammation in the nervous or muscular system; also perhaps to separate the group from the toxic neuritides. From this point of view a proper designation would be "idiopathic," rather than "primary." The latter term would seem to indicate the muscles themselves as the starting point of the trouble in all cases; this is not known to be the case. The progressive nature of the disease is important; although this tendency is much more marked in some types than in others and there are cases which practically have become arrested, or apparently so, for very long periods of time.

Historical. Spiller (2) gives a good brief account of the development of modern knowledge concerning the muscular atrophies. The early writers naturally did not separate the different types. Some described the true atrophies, of one variety or another; other reports show now that the real condition was syringomyelia or some other distinct entity. Bell, in 1836, gave the first published case report; others who wrote in a descriptive way around that time were Dubois, van Swieten, Abercrombie, Groves, Darwell and Cruveilhier. Duchenne in 1849 and Aran in 1850 expressed the indiscriminating view that the site of the pathology in these cases was in the muscles themselves; this view was strengthened by Meryon, who in 1852 published the report of an autopsy in a case showing a normal nervous anatomy, undoubtedly a case of true myopathy. However, Cruveilhier, soon afterward, also Luys and Clarke, furnished anatomical proof that in some cases of atrophy the disease process is to be found in the anterior horns of the gray matter of the spinal cord. Duchenne and Aran were thus led to revise their opinion expressed

above. Duchenne and others, about 1853, began to write about the dystrophies, the special characteristics of which were being noted. Still more particular varieties were described with increasing accuracy in the next few years; as examples, Erb in 1882 presented the juvenile type of dystrophy, and in 1884 Landouzy and Dejerine recognized the fascioscapulohumeral variety. In 1886 Charcot and Marie in France, and Tooth in England, independently described the now familiar type known as the peroneal type, also known by the names of these three observers. All of these varieties of muscular atrophy, with rather characteristic pictures and with a paucity of necropsy



material, led to a belief that the group of cases known as the Duchenne-Aran group, spinal in origin, did not exist. Schultze and Kahler, in 1888, who separated syringomyelia, and Charcot by distinguishing amyotrophic lateral sclerosis, contributed to this idea. Marie voiced this idea boldly in 1897; however, Erb clearly recognized the myopathies as distinct from the muscular atrophies of spinal cord origin. Apart from the dystrophies on the one hand, also apart from the peroneal group, Charcot saw that two classes of cases remained: the flaccid type, of central origin, known by the names of Duchenne and Aran, and the spastic type, likewise originating in the cord, separated as amyotrophic lateral sclerosis. This association of the latter disease with the Duchenne-Aran type was supported by Leyden and Gowers, who saw in the two conditions

the same disease process at work in contiguous parts of the spinal cord; and in more recent times this view is also advocated by Thomas and other students of the subject.

A helpful tabulation of the atrophies which brings to mind the accepted close relationship of the different varieties is given by Jelliffe and White (3) as follows:

PRIMARY PROGRESSIVE MUSCULAR ATROPHIES

1. Progressive nuclear atrophies.
 - a. Infantile (Hoffmann-Werdnig).
 - b. Adult (Duchenne-Aran).
 - c. Mixed forms.
2. Spinal neuritic atrophies.
 - a. Peroneal-arm (Charcot-Marie-Tooth).
 - b. Tabetic type (Dejerine-Sottas).
 - c. Peroneal type and arm type (Sainton and Haenel).
3. Muscular dystrophies.
 - a. Hereditary (Leyden-Moebius).
 - b. Juvenile pseudohypertrophy.
 - c. Mixed forms.

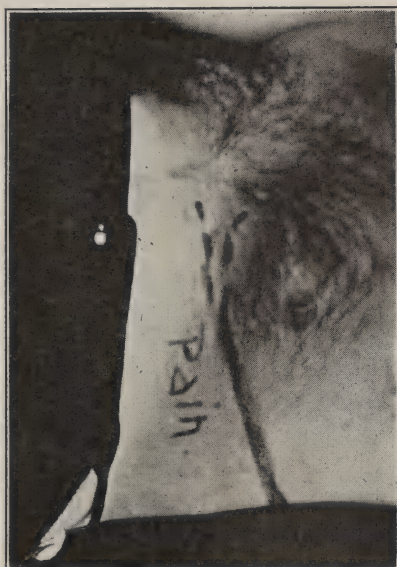
This table expresses the idea that one process is in operation, whatever its nature, attacking the spinal cord, upper or lower motor neurones or both, and producing flaccid or spastic paralysis, as the case may be; attacking the peripheral nerves with the results described by Tooth, Dejerine and others; or, finally, affecting the muscles themselves either directly or through the ultimate nerve endings, as in the dystrophies.

Tooth,(4) in his stimulating report of observations, points out that the myelopathic, neuropathic, and myopathic atrophies cannot be regarded separately; although it is convenient to recognize types. Atypical cases of every description indicate that no one of the three attacks any part of the body exclusively; that heredity and course are inconstant; that a strong familial tendency may manifest itself by a myelopathy in one member, by a myopathy in another member of the family; and that a few cases may combine some of the features of a myopathy with those of a neuropathy.

Etiology. Modern interest in this disease undoubtedly centers chiefly in the question of etiology. No specific cause is known. The one important fact is obvious—that heredity and familial tendency play a part. Progressive muscular dystrophy has afflicted generation after generation in certain families. The tendency of spinal muscular atrophy in this direction is very much less pronounced. In this as in

so many other respects, the neural type of atrophy occupies an intermediate position.

Muscular dystrophy usually begins in childhood, neural muscular atrophy during the pubescent or adolescent period, and the Duchenne-Aran type in adult life. This general truth, together with the frequent history of similar disease in the same family, points to a degeneration of congenitally defective tissue as the real cause of the affection. Such is the belief of most writers. Occasionally syphilis has been present either in the patient or in his family. Pregnancy at



times has seemed to exercise some influence on the evolution of the process; and the picture of a true progressive muscular atrophy has, in isolated cases, resulted from a true inflammation of the cord, a myelitis, as proved by necropsy. But all these certainly are accidental or coincidental matters. A bacterial cause has never been proved, and the natural history of the disease is opposed to such a theory.

Recent Studies on Etiology. Of great interest is the desire, very evident on the part of some endocrinologists and some laboratory workers, to prove that progressive muscular atrophy is an endocrinopathy. Timme (5) in 1917 studied a group of cases of dystrophy. The only evidence brought out that an endocrine disturbance might be operative in these cases is the fact that two cases out of five showed some calcification of the pineal gland. However, we all meet with patients not remotely suspected of either dystrophy or endocrine

disease who nevertheless have calcification of the pineal. Timme further states that many patients with dystrophy have stigmata of malfunction of some part of the endocrine system: abnormal skin coloring, thinning of bones, sexual infantilism or hypertrophy, hypoglycemia, struma, etc.

Janney, Goodhart and Isaacson,(6) in the next year, also felt that endocrine dysfunction was reasonably suggested by the picture of the dystrophies. To obtain evidence of metabolic disturbance, which would tend to confirm their opinion, they did considerable laboratory work on nine cases of dystrophy. In substance, they found uniformly (a) a disturbance of the creatinin-creatin metabolism and (b) hypoglycemia with impaired carbohydrate utilization. McCruden and Sargent (7) made the same observation in their cases of dystrophy. The latter authors, however, found creatinuria to exist in progressive muscular atrophy as well. Myasthenia gravis was accompanied by hypoglycemia but not by creatinuria.

These interesting findings are not sufficient to make the case for the hypothesis of endocrinopathy, of course. Confirmatory reports are few; and in any case the finding of creatinuria may be indicative of nothing more fundamental than the wasting of muscular tissue. It is absent in myasthenia gravis, where wasting does not occur. Similarly it is possible that changes in the blood sugar are only incidental to the reduction in the amount of muscular tissue, normally available as a depot for the storage of glycogen.

REPORT OF CASES

Case 1. This patient is W. P., a white man, forty-eight years old, American, by occupation a marine engineer. There was a brother, who about ten years ago died of pulmonary tuberculosis, having previously been robust. The mother died at the patient's birth. The father was a heavy man, weighing over 250 pounds; he died of cardiorenal disease. Father and son worked together for some time, and the patient recalls that his father had an affliction of the hands which prevented him from fully extending the fingers and also made his grip weak. This is the only indication of possible neurological disease in the family. The patient has several children, all under twenty, who have been seen by us. Nothing suggestive of atrophy or weakness has been found.

Except for the present condition the patient has practically never been ill, and he denies venereal infection.

It appears that about thirty years ago the hands became noticeably weak, stiff and clumsy. This condition has since then progressed very slowly. Symptoms in the legs developed much later, at least it was much later when they became troublesome. At first the patient stated that his legs became weak four years ago; however, a record

made twelve years ago shows that definite involvement of the lower extremities already existed. At this time, that is, twelve years ago, the patient was seen at the Johns Hopkins Hospital dispensary by Dr. Thomas, who made the diagnosis of progressive muscular atrophy, peroneal type. The notes preserved from that period are few and scattered, but suffice to show that the disease has made little progress since then, and that principally in the legs, which are decidedly weaker now.

The patient was first seen by us in April, 1920. Constant observation since then has failed to show any marked change. A description of the condition follows:

Subjective condition. He feels perfectly well except for the weak-



ness in the legs and to a less degree in the hands. He can walk a mile or so without great difficulty if he proceeds slowly. While the strength of his hands is much reduced, he is well able to care for himself. At times there is urgency of micturition; but the function of the anal sphincter is intact. Sexual desire and power are said to be undiminished. There is no dysphagia, no pain and no paresthesia.

Objective condition. The patient is of medium height, very sparsely nourished, rather anemic in appearance. The mentality is quite normal for his type.

Eyes. Slightly more prominent than usual. There is slight ptosis of the left upper lid. No von Graefe sign. The pupils are small, equal and normally responsive to light and accommodation. No nystagmus, no disturbance of the extrinsic muscles of the eyeball.

The *thyroid* gland is small, very firm, and somewhat irregular in contour. In places it feels very hard, almost fibrous. The right lobe is a little larger than the left.

Facial muscles intact.

The *tongue* is perhaps a little flabby, with very slight furrowing, both longitudinal and transverse; it is protruded straight, with no tremor.

Speech. Although the speech is somewhat indistinct, it is not definitely slurring, and the indistinctness is probably due to carelessness. Test phrases are repeated very well, better than ordinary speech.

Heart, lungs, and abdominal organs are all normal.

Arms. The arms are thin, but not definitely atrophied, except to a moderate extent in the forearms. The biceps and triceps are weak. Shoulders and neck are normal. There is an appearance of wrist-drop, but the wrists are actually fairly strong. The hands show very definite atrophy of the thenar and hypothenar eminences, and to a less degree of the interossei. Very little power of gripping remains. The hands are flaccid. The patient can only close the hands slowly. If he grips hard the hands can only be opened slowly, stiffly; if he does not grip hard, he can open the hands quickly and easily. No fibrillary twitchings are observed in the hands or arms.

Legs. The patient walks with a semi-spastic gait, flinging the feet a little and not quite straightening the knees. He stands with the knees slightly bent. He is unable to rise on the toes. Voluntary motion at the ankle and in the toes is almost abolished. Passive motion is possible in all directions, the only marked limitation being in dorsal flexion of the foot. All the muscles below the knee are greatly wasted and very flabby. Above the knee the muscles are fairly well developed except in the lower third. At times slight twitching has been observed in the thigh muscles.

Reflexes. The abdominal and cremasteric reflexes are present. Biceps and triceps jerks not obtained, likewise the periosteoradial reflex. Patellar reflex elicited only on reinforcement; Achilles jerk not obtained at all. Babinski and Romberg signs negative.

Sensation. No disturbance of any of the forms of sensation can be made out.

Electrical reactions. The intrinsic muscles of the hands do not respond to either current. In the muscles of the forearms there is a small amount of R.D., especially in the radial nerve distribution. As in the hands, no response of either nerves or muscles is obtained with either current, in the legs below the knees. The muscles of the thighs appear not to be affected.

Laboratory investigations. Routine examination of the blood showed a slight anemia, otherwise nothing of interest. The urine was likewise negative. Blood Wassermann negative. The spinal fluid was clear, contained five cells per cubic millimeter, gave a negative test for globulin and a negative Wassermann reaction.

The blood contained in each 100 c.c.:

36.9 mg. total non-protein nitrogen.

14.25 mg. urea nitrogen.

1.36 mg. creatinin.

186.0 mg. sugar.

On another occasion 100 grams of glucose was ingested:

Blood sugar before ingestion..	0.086 per cent
After 30 minutes.....	0.095 per cent
After one hour.....	0.099 per cent

A twenty-four-hour specimen of urine contained 98 mg. of creatinin per 100 c.c., of which 80 mg. was preformed creatinin, leaving 18 mg. as the measure of a definite creatinuria.

Roentgenograms were made of the skull and of the principal long bones, but were quite negative.

A bit of muscle tissue was excised from the peroneus longus, for histologic examination. The muscle fibers were found much shrunken, poorly staining, with the striations visible only here and there, and faintly. Considerable infiltration of areolar tissue was to be seen.

Case 2. When this patient was first seen, in April, 1920, she was fifteen years old. She is a white girl, born in America of Jewish parents. Her complaint was of pain in the sides, meaning the loins and lower abdominal quadrants. In due time a diagnosis of chronic appendicitis was made and confirmed at operation.

Incidentally the condition of the extremities was noted and became the object of our continued interest.

Anamnesis brought out that five years ago first the left and then the right foot became weak, the ankles turning in. Some pain was present in ankles and calves, on walking. Clumsiness and weakness of the hands reached a noticeable degree two or three years later. Wasting of the extremities accompanied or more probably preceded the onset of symptoms. Prior to this, at least between the ages of ten and twelve, the patient states, she was rather plump and had well-developed legs.

Dr. Thomas of the Johns Hopkins Hospital in 1919 recognized the case as one of the peroneal type of progressive muscular atrophy. A summary of notes made by him and by Dr. Baer of the orthopedic department follows:

Dr. Thomas: "Onset one year ago with the left foot turning in. About three weeks later the right foot also. Pain in the ankles and calves on walking. Examination shows pupils normal, fifth and seventh nerves negative. Steppage gait. R.D. in peroneal group. X-ray shows pseudosacralization of fifth lumbar vertebra."

Dr. Baer: "Left tibialis anticus gone. Extensor proprius hallucis gone. Extensor digitorum communis weak. Peroneal gone. Right extensor proprius hallucis and tibialis anticus gone. Extensor digitorum communis weak. Peroneal working, calf muscles working. Quadrati working both sides, weak. Hamstrings strong. Beginning atrophy infra- and supra-spinati. Face normal. Wrists fair. Atrophy muscles of hands. Electrical: Complete R.D. external and internal popliteal nerves."

Family and personal history. The father is excitable, with a tendency to become hysterical; and the mother also is nervous; but no member of the family except the patient has ever suffered from any form of muscular weakness. There are four other children, who are all quite normal in this regard.

The patient had a normal childhood. Menstruation, which began at fourteen, is regular, accompanied by severe pain.

Present condition. The general condition of the patient is very good, if anything she can do more in the way of walking, dancing, etc., than she could three years ago. The *weight* has increased, is now ninety-five pounds; height, five feet. *Heart* and *lungs* normal. *Pupils*, right slightly larger than left; both react normally. *Tongue* protruded in midline without any maintained tremor, and is not atrophied. The *facial muscles* are not affected. The secondary *sex characters* are very well marked; the pelvic organs are normal.

Extremities. There is practically no difference between the two arms. The hands are somewhat cool but normal in color. Sensation is normal. On the back of the hands there is a slight depression between each two metacarpal bones. The thumbs are held in the same plane with the fingers. The flexor tendons stand out in the palms. The thenar eminences are flat, even slightly hollowed out. Likewise the hypothenar groups are wasted. The forearms appear only slightly smaller than normal, the greatest wasting being evident on the radial side. In appearance the upper arms and shoulders are quite normal. The grip is weak but of a useful degree. The fingers, wrists and elbows are all freely movable, there being no contracture. The thumbs can be opposed to the first and second fingers only. The adductor and opponens pollicis are very weak. The dorsal and palmar interossei function, although not strong. The wrists are fairly strong, especially in flexion.

No fibrillary twitching is seen in either arm.

Both feet are in the position of foot-drop, with flaccid pes equinovarus, somewhat more marked on the left. The legs from the knees down are slightly cyanotic and cool. Sensation is normal. Passively, the feet can be moved dorsally to about a right angle. No active motion in the ankles is possible. There is very little passive motion in the metatarsal joints. No active movement of the toes. The sense of position is preserved in the toes. The peroneal muscles and the tibialis anticus are wasted in both legs. The calf muscles also are wasted and the consistency of all these muscles is soft, rather doughy. Extensors and flexors of knees and thighs are strong, especially the extensors. The wasting involves only the lowest part of the thighs, about the lower third. No fibrillary twitching is seen in either the thighs or the legs; although there are occasional twitchings of muscle groups in the thighs. Most of the wasting in the thighs is in the anterior and external groups. Adduction, abduction, flexion and extension of the thighs on the trunk are well performed.

Measurements of the extremities follow:

Wrists: right 14.25 cm., left 13.75 cm.

Forearms: right 20.75 cm., left 20.25 cm.

Biceps: right 21.5 cm., left 22 cm.

Ankles: right 18 cm., left 17.75 cm.

Calves: right 23.75 cm., left 23 cm.

Thighs, lower third: right 28.75 cm., left 29.25 cm.

Thighs, upper third: right 45 cm., left 44.5 cm.

Reflexes. The abdominal reflexes are present. Knee jerks and arm jerks obtained, although much diminished. Ankle jerks not obtained. Plantar stimulation causes no response. Romberg sign negative.

Gait. The legs are lifted broadly at the hips, with a slight bending of the body to the opposite side. The feet are flung outward in advancing.

Electrical. R.D. present both in the legs and in the hands.

Laboratory. Routine urinalysis and blood examination negative. The blood Wassermann reaction was negative. Spinal fluid: clear, with three cells in a cubic millimeter; Wassermann negative; Pandy positive; colloidal gold curve normal.

The blood, in 100 c.c., contained:

33.0 mg. non-protein nitrogen.

15.3 mg. urea nitrogen.

1.2 mg. creatinin.

181.0 mg. sugar.

A twenty-four-hour specimen of urine showed of total creatinin 132 mg., of preformed creatinin 120 mg., leaving a creatinuria of 12 mg. per 100 c.c.

X-rays of the skull and long bones showed nothing abnormal.

A piece of muscle was excised from the peroneus longus and examined histologically. The muscle fibers were much shrunk, with the sarcolemmar nuclei clumped together. Striations were seen, but indistinctly. Considerable fatty tissue separated the muscle fibers.

SUMMARY

1. Progressive spinal muscular atrophy, progressive neural muscular atrophy, the dystrophies and amyotrophic lateral sclerosis are probably best considered together, as a group of diseases affecting the motor nerves and end-organs; characteristic features of the different members of the group may overlap in the same case.

2. The etiology is unknown but most likely resides in some congenital deficiency of the tissues concerned. Heredity is not uncommon, but is not diagnostically essential. No good evidence has been adduced that an endocrinopathy is responsible.

3. Our first case is undoubtedly of the Charcot-Marie type, the principal argument in favor of this diagnosis being the extremely slow course of the affection. If so, it is interesting that the hands were first involved instead of the legs, as usual. Although sensory disturbances are described as not uncommon in this type, none exist in this instance. There is no definite evidence of heredity; but the father may have been somewhat similarly afflicted. No endocrinopathy is manifest; but the thyroid gland is anatomically abnormal. Hypoglycemia is not present; in fact, the blood sugar is rather high. This is of interest because of the reported finding of hypoglycemia in

the dystrophies. The finding of creatinuria accords with the observations of McCrudden and Sargent.

4. The second case is typical in the site of the onset. Sensory disturbance is absent. Hereditary influence apparently plays no part. There is no sign of any affection of the endocrine system. Blood sugar above the average is found in this case also; creatinuria is present.

26 E. Preston St.

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SOCIETY PROCEEDINGS

SOCIÉTÉ DE NEUROLOGIE DE PARIS

FIFTH INTERNATIONAL ANNUAL MEETING, HELD MAY 30 AND 31,
1924, AT THE SALPÊTRIÈRE, PARIS

MULTIPLE SCLEROSIS

Otto Veraguth of Zurich reported as follows: Multiple sclerosis is a question of burning and immediate importance; it is one of the most common organic nervous diseases; and although not in itself fatal, it causes long and pitiful invalidism! At present there is an inquiry taking place in Switzerland, and although unfinished, it indicates that there is probably one case of multiple sclerosis to every 3,000 inhabitants, an incidence greater than that of neurosyphilis.

The diagnosis of the disease must not rely on the appearance of the classical symptoms described by Charcot, nystagmus, scanning speech, and intention tremor, for this triad only occurs in about 10 per cent of the cases. Multiplicity of symptoms is the rule, and thus differential diagnosis may be difficult. Fever may be present in the acute attacks. Manganese poisoning may closely resemble multiple sclerosis, but a history of exposure to manganese can be obtained in these cases. Hysteria may imitate this disease, but Babinski's sign will usually differentiate the functional from the organic disease, although the extensor plantar reflex may be temporarily absent in multiple sclerosis, and nothing is easier for the hysteric to imitate than the Babinski phenomenon. Other conditions to be considered in the differential diagnosis are: epilepsy, paralysis agitans, hemiplegia, lacunar degeneration of Marie, tuberous sclerosis, extracortical axial aplasia, Wilson's syndrome, cerebral tumor, cerebellar atrophy, hereditary ataxia, and Friedreich's disease. Spinal types of multiple sclerosis may be confused with syringomyelia, cord tumor, subacute combined degeneration and myelitis. In fact, the old term, "spastic spinal paralysis," certainly indicated at least three common conditions: spinal syphilis, cord tumor, and multiple sclerosis.

To summarize: If we except the classic form of Charcot, we see that multiple sclerosis may simulate the most diverse diseases, and may lead to many errors of diagnosis. But there are certain criteria of this disease which are relatively certain: (1) The multiple distribution of lesions indicated by the symptoms; (2) the evolution of the disease by exacerbations interrupted by remissions; (3) the absence of abdominal reflexes; (4) dysmetria; (5) optic atrophy. These five appear in the majority of cases, but not by any means in all cases.

In the spinal fluid, Oberholzer of Zurich is observing the spectrographic changes according to the method of Victor Henri. These seem to show in the region of the ultra-violet rays traces of inorganic substances in solution, perhaps due to myelin degeneration. Possibly this method will give a diagnostic criterion.

There are two explanations of multiple sclerosis: one, that it is a primary, essential sclerosis (the "periaxial sclerotic encephalomyelitis" of Marburg), and the other that the sclerosis is secondary to an inflammatory process (Erb, Marie, Borst). To us the inflammatory process appears the more plausible. For one thing, primary degenerative diseases of the nervous system are rare, and multiple sclerosis is common; also the primary degenerations are familial or hereditary. We certainly do not yet know anything about the means of transmission—Steiner's theory of transmission by a tick is supported by little evidence—and epidemiological studies, though suggestive, give no true clue. The bacteriological work, also, is indefinite, and it seems to me that in all the positive results reported there is little that can withstand the criticisms of such competent bacteriologists as Noguchi and Dörr.

It is difficult, often, to explain the symptoms of multiple sclerosis on a physiological basis, for the lesions found at autopsy may not give an anatomical explanation of the disturbed function. If, however, one thinks of the different degrees of disturbance of excitability which may follow a lesion, either in the affected region itself or in nearby intact areas, Von Monakow's theory of "diaschisis" satisfactorily explains the great variability of the clinical manifestations. In this way we can explain disturbances in neurones far from the lesion but functionally connected with the injured neurones.

Treatment is at present tentative. Injections of calomel, fibrolysin, and salvarsan have been tried with varying success. The researches of Stern of Geneva show that preparations like salvarsan probably cannot pass the choroid plexus. As a rule, patients suffering from multiple sclerosis do not withstand surgical operations well. Rhizotomy is perhaps an exception, and may give good results.

Georges Guillain, Paris, also reported as follows: Next to syphilis, multiple sclerosis is the commonest disease of the nervous system. The patient is usually twenty to thirty years of age, and the primary attack passes without much attention being paid to it, the history eliciting merely a story of light and transitory difficulties in walking, paresthesia, or vertigo. Some months after this the patient has fatigability, difficulty in walking, unsteadiness, stiffness of the legs, disagreeable paresthesias of the hands and feet, and perhaps difficulty in starting micturition. To the above list of symptoms may often be added vertigo, diplopia, and diminution of visual acuity. When the patient is examined there is no muscular weakness found, but a slight dysmetria often disturbs the delicate movements of the limbs. The tendon reflexes are exaggerated, there is clonus, a bilateral Babinski, and abolition of the abdominal and palatal reflexes. Objectively, there are no sensory disturbances, except a diminution

of the vibratory sense in the feet. There may be nystagmoid jerks and hippus. The spinal fluid shows a negative Wassermann and positive colloidal reaction. Such is the common picture. After two or three weeks of rest the symptoms may disappear, only to return in one, two, or three years. Then slowly, with each exacerbation, the spastic paralysis increases.

The author then discussed more at length the motor disturbances, the reflex abnormalities, the sensory, urinary, and ocular troubles. Symptoms related to the vestibular nuclei were very common, vertigo, nystagmus, tinnitus, nausea, and forced movements being found. Deafness and lesions of the cochlear apparatus were not found. The author agreed with American observers that there is no typical psychic state associated with multiple sclerosis. The sympathetic system and the endocrine glands are not affected.

Besides the common picture described above, Guillain said that the "classical form" is seen in about 12 per cent of the cases. This consists of unsteady gait, intention tremor, scanning speech, exaggerated tendon reflexes, abolished abdominal and palatal reflexes, nystagmus, and optic atrophy.

The form with "ocular onset" is important, with its progressive diminution of vision, or perhaps sudden amaurosis, due to a retrobulbar neuritis. This alone, with exaggerated reflexes and a positive C.S.F. reaction to colloidal tests, may make the diagnosis. Sphenoidal sinusitis must be ruled out. The "pure paraplegic form" is common and may be confused with syphilis, but here again the examination of the C.S.F. will make the differential diagnosis.

Guillain emphasized the fact that the examination of the spinal fluid could give important information. Lymphocytosis he finds rarely; an increased albumen content is not regularly found; the globulin reaction is usually negative, and the Wassermann reaction is always negative. It is the colloidal gold and colloidal benzoin reactions which are of interest; the latter is positive in 63 per cent of the cases; a typical benzoin reaction made with the 15 tube technique would read "00100,01200,01100."

(The rest of the report, *i.e.*, the part concerning pathology and etiology, was presented May 31, *vide infra*.)

Following these two reports, other clinical aspects were discussed:

Jean Piltz (Cracow) spoke of frequently observing paresthesia in the legs; this was usually most marked in the toes, diminishing in the feet and legs. Loss of position sense might be found in the same distribution; vibratory and tactile anesthesia were not rare.

Long (Geneva) spoke of the differential diagnosis, accenting the possibility of confusion with tumors of the cord.

André Thomas pointed out the importance of a history of remissions in making the diagnosis; the disease is intermittent. The symptoms may vary greatly from time to time, and suggestibility may play a rôle.

Barré (Strasbourg) said that symptoms referable to the cere-

bellum and the vestibular nuclei were very common, vertigo, titubation, head and eye nystagmus being usual phenomena. The pure paraplegic form is less common than is usually supposed, for a careful history elicits the occurrence of cerebellar symptoms, transient periods of incoördination being indicated by a history of inability to manipulate small objects. Pain, when present, is central in origin. The C.S.F. pressure may be raised.

In the afternoon session, the clinical discussion was resumed.

Lagrange (Bordeaux) discussed pupillary reactions.

Velter gave an historical review.

Henri Claude told of his psychiatric experiences, saying that multiple sclerosis was never a cause of a psychosis.

I. Souques emphasized the insidious onset, and discussed spinal fluid chemistry.

Babinski stated that an extensor plantar reflex was a practically certain indication of organic disease, and said that an imitation of this reflex by an hysterical patient could always be recognized and differentiated from the true reflex.

CLINICAL DEMONSTRATION. This was held Saturday morning, May 31. Interesting cases were shown by Professor Guillain and his associates, by Souques and Bullock. Dr. André Thomas showed a splendid cinema film illustrating various symptoms, especially asynergia of the trunk without incoördination of arm movements. He attempted to correlate these complex phenomena with the autopsy findings.

Monrad-Krohn (Christiania) presented an excellent film illustrating the dissociation of voluntary and emotional innervation in facial paresis of central origin (not due to multiple sclerosis).

Guillain continued his report, taking up the pathological anatomy:

The sclerotic plaques—the areas of sclerosis are the end result of a diffuse degenerative process, and should not be studied as the central point in the pathology, for their locations cannot be narrowly correlated with the clinical symptoms. The three places of election of these plaques are perivascular, subpial, and subependymal. As pointed out by Bertrand, these are the dumping-grounds of the products of degeneration of the C.N.S. In the old plaques of two or three years' duration, there is fibrous neuroglia. This does not touch the axis cylinders which are diminished in number, reduced in size and demyelinated. No products of active degeneration are found. In the recent plaques, all the processes of degeneration may be seen. There is much lipoid debris and many phagocytes. Bertrand has clearly demonstrated that the process of degeneration takes place in each neuronal unit separately; beside a demyelinated axone may be a perfectly normal fiber. Outside the plaques altogether, one may find much pathology, especially in the contagious areas. These areas are indeed more important than the plaques which are really scars. The axones are seen to be attacked early, and are swollen, the edema separating the neurofibrillæ; or they may

merely lose their staining affinities. The myelin sheaths are altered and surrounded by phagocytes. The vessels show perivascular infiltration with round cells and phagocytes, a result of eliminating the products of degeneration. Secondary degeneration of the Wallerian type may be found, usually showing as a pallor of the cortico-spinal tracts. A terminal type of diffuse demyelination has also been observed.

In discussing etiological factors, Guillain reviewed the main facts of age incidence, inheritance, familial occurrence, occupation and geographical distribution. He said that the clinical characters of the disease, and its pathology, both indicated a diffuse infection of the nervous system. This infectious origin was first maintained by Marie in 1887. Guillain is even willing to express the opinion that multiple sclerosis is due to a specific organism, as specific as that of rabies, encephalitis lethargica or syphilis. But it has no relationship with syphilis. The experimental work of Bullock, Steiner, Marinesco, Adams, Noguchi and others was reviewed. To this was added evidence obtained at the Salpêtrière and Institut Pasteur. In spite of all this work, no definite conclusion can yet be reached. Further experiments on monkeys must be carried out.

Bertrand then showed lantern slides illustrating his pathological studies (described above by Guillain). He emphasized the degeneration of the axones, and the subependymal and subpial distribution of the plaques.

Schroeder (Copenhagen) described intranuclear inclusions of rod-like bodies, and illustrated them with excellent lantern slides. He believes the disease to be infectious, probably spirochetal.

Jumentié showed lantern slides illustrating the pathology, especially the perivascular infiltration, the increased vascularity and meningitis. These points indicated how closely the disease may resemble syphilis. In fact it is difficult to distinguish it from syphilis both pathologically and clinically.

Lhermitte gave an illustrated exposition of the pathology. He showed that meningitis was an important finding, and might even be so marked as to resemble general paresis. The plaques are often perivascular, and there are also characteristic vascular changes not seen in other degenerative diseases. The reaction about the spinal and cranial nerve roots is also interesting, especially the optic and acoustic nerves. In the cord, lesions are often found at the junction of the spinal nerves and dura. This observation is in line with Nageotte's on syphilis, and suggests that the virus is in the spinal fluid. Considering the vascular changes, the general pathology, and the lesions in other organs, it would seem that the disease is a special infection. He described other nervous diseases with somewhat similar pathology, pointing out that it is necessary to study these also, and to know their relationship to multiple sclerosis. For example, he described leuco-encephalitis, a remarkable inflammation of the white matter of the brain, somewhat resembling multiple sclerosis, but with a stormy clinical course.

Long (Geneva) presented case histories, and showed patho-

logical specimens, illustrating the difficulty of correlating the two.

Marquezy told of his experimental work with blood and spinal fluid from nine acute cases, injected into twenty-one rabbits and one monkey. The results were negative, both for lesions resembling multiple sclerosis, and for spirochetes.

Targowla talked on the "benzoin colloidal" reaction, and showed typical results. The reaction is read in 16 tubes, and in multiple sclerosis the readings may be:

"0010022221000000"

"0220221000000000"

"1221221000000000" for example.

The Wassermann reaction is always negative, and the cell count and albumin content is usually normal.

Mestrezat told of the importance of chemical study of the spinal fluid, to indicate the nature of the process of degeneration and the absence or presence of organisms.

André Thomas gave a pathological review, pointing out the periaxial degeneration, the tumefactions of the axones and their disappearance. At times there is perhaps an abortive regeneration. These degenerations were illustrated with lantern slides of longitudinal sections, bringing out the axonal changes well. He questioned whether the benzoin reaction proved the absence of syphilis, and whether multiple sclerosis had been scientifically proved to be a disease distinct from syphilis.

Leri discussed familial cases, and considered them rather as evidence of contagion than inheritance.

Meige closed the meeting with the announcement that the annual reunion next year will be in June, the subjects for discussion being *Amyotrophic Lateral Sclerosis* and *Migraine*. Both of these diseases were of particular interest to Charcot, and this meeting will celebrate both the centenary of Charcot's birth, and the twenty-fifth anniversary of the founding of the Société de Neurologie de Paris.

Report by

STANLEY COBB, M.D., and

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CURRENT LITERATURE

II. SENSORI-MOTOR NEUROLOGY.

1. SPINAL CORD.

Nonne, M. MYELOMA OF THE SPINE. [Neurol. Centralbl., 1921, XL, 2; Medical Science.]

Nonne gives a short review of the principal observations on this condition and a summary of the clinical picture. He describes a case in which a myelomatous nodule in the first thoracic vertebra gave rise to peculiar nervous symptoms. The patient was a man of fifty-seven, who came under observation for pains in the neck and arms, and for progressive wasting and pallor. A first examination revealed nothing but tenderness of the lower cervical and upper thoracic spine, albuminuria, and anemia. He was admitted to hospital and four days later developed retention of urine. At this time there was marked tenderness of the lower cervical spine, a slight angular curve, and wasting of the ulnar muscles of the right arm and general weakness of this limb. Priapism and cyanosis of the penis appeared, myosis and loss of light reaction in the pupils, and then generalized cyanosis of the face, lip, and extremities. The cerebrospinal fluid was practically normal, and X-ray examination revealed rarefaction of the first thoracic vertebra. He died six days after admission to hospital. The diagnosis made during life was meningo-myelitis of the cervical cord of unknown origin.

At autopsy, the first thoracic vertebra was practically completely replaced by myeloma, which, however, did not project into the spinal canal. There were multiple myelomata in spine, ribs, and sternum. To the naked eye and microscopically the spinal cord and meninges were normal. The priapism remained after death.

Myosis and priapism are known to occur in lesions of the first dorsal and lower cervical segments of the cord. Nonne recalls observations in which so-called toxic nervous symptoms have been described in the nervous system as occurring in the course of cases of malignant disease in various parts of the body (Oppenheim, Bruns, etc.), and he concludes that the nervous symptoms in his case are of this nature. Although myeloma may not be malignant in the same sense as carcinoma, yet its course is invariably fatal, and he suggests that the appearance of nervous symptoms related to neighboring segments of the cord in association with myeloma of the first dorsal vertebra may be regarded as evidence of malignancy in myeloma. [F. M. R. Walshe.]

2. BRAIN, ANATOMY PHYSIOLOGY, VASCULAR DISTURBANCES.

Laignel-Lavastine. APHASIA AND APRAXIA. [Bulletin Medical, March, 1920, XXXIV, No. 17.]

A general discussion of certain of the more outstanding features with some practical tests for determining the character of the aphasia. These are tests for spontaneous speech, for reading aloud, repeated words, spontaneous writing, writing from a copy and writing from dictation, comprehension of spoken and of printed words. The simple reflex and expressive movements must be studied in the apraxic tests.

Weed, L. H. THE CELLS OF THE ARACHNOID. [Bulletin of the Johns Hopkins Hospital, October, 1920.]

The morphology of the cells lining the subarachnoid space and the conditions which determine their changes in form are discussed in this paper. The arachnoidea consists of an arachnoid membrane, from the inner surface of which arachnoid trabeculae project to the pia. This membrane is cellular in structure with a delicate supporting reticulum, covered on both sides by cells which are continued on to the trabeculae. While resting they are low, flat, and with large, pale, oval nuclei. The cytoplasm contains fine granules larger than the nucleus. Carbon particles stimuli cause the arachnoidal cells to enlarge, become cuboidal, and multiply. They also become phagocytic. Finally, they may become detached, forming free-moving macrophages in the subarachnoid space. A similar response occurs on the injection of isotonic solutions of laked blood and in the early stages of certain infections of the meninges. A further significant change in the cells of the arachnoid membrane is the tendency to form well-localized cell clusters. These cell clusters were studied in material from a series of cats. They were never seen in very young animals and showed a definite increase in number with age. They were observed by staining the membrane *in situ* with a dilute solution of toluidin or methylene blue, after removal of the cranial vault. While visible to the naked eye, they were best examined with the binocular microscope and by the study of histological sections. As has long been known, these cell clusters are the seat of the areas of calcification frequently found in the arachnoid membrane. In two of the cats examined, however, a much more intense proliferative process had taken place in the meninges. In the one animal there were apparently enlarged cell clusters, while in the other animal two obvious masses of new growth, forming relatively large tumors, were present. On microscopic examination both the apparent cell clusters and the tumors were found to show all the characteristics of the so-called dural endothelioma in man. These observations and other evidence strongly suggest that endotheliomata of the meninges arise as the result of increased hyperplasia of the arachnoid cell clusters. The question as to whether the cell clusters themselves are due to pathological causes or are merely a result of senescence is decided by the author in

favor of their being due to old age. The regional distribution of the cell clusters in the cat was found to be as follows: In the brain the greater number of nodules appeared in the arachnoid membrane as it bridged the larger sulci, particularly in the cruciate and Sylvian regions. In general, the dorsal regions of the brain presented numerous nodules, while the ventral surface of the brain stem was practically always free. The same rule applied to the spinal cord.

Bassoe, P., and Hassin, G. B. CALCIFICATION OF CEREBRAL VESSELS. [Am. Archives of Neurology and Psychiatry, October, 1921, VI, No. 4; J. A. M. A.]

Bassoe and Hassin report a case which is interesting in three respects: First, a diagnosis of brain tumor was clinically justifiable and several operations were performed in the hope of removing the supposed tumor. It was an example of so-called pseudotumor cerebri. Second, epileptiform attacks of petit mal and grand mal types were the principal symptoms, so the case shows what kind of changes occasionally may cause such attacks. Third, and chiefly, the case is of interest on account of the most unusual pathologic condition presented, namely, a large indurated area in the interior of the left hemisphere in which the capillaries were infiltrated with a hyalin, or colloid material, and also calcified to such an extent that decalcification was necessary for the preparation of suitable microscopic specimens.

Caldwell, John A. CONTRECOUP DAMAGE TO THE BRAIN IN HEAD INJURIES. [Ohio State Medical Journal, February, 1922.]

It has often been found that persons who receive head injuries exhibit focal cerebral symptoms referred to the pole of the brain opposite to point of injury. Such opposite pole damage is called the contrecoup phenomenon, and in the opinion of the writer it occurs much more frequently than is commonly recognized. In support of this belief he quotes the statistics of E. R. Le Count, who found contrecoup brain damage present in 66.98 per cent of 454 cases dead of head injuries. It is particularly apt to occur in fractures of the posterior fossa. It was not infrequently found in the experience of Le Count that the contrecoup damage to the brain was greater than that immediately beneath the fracture.

O. Tillmann, in 1902, investigated this phenomenon clinically and experimentally. His experiments were made by dropping trephined skulls, fracturing them by hammer blows, and subjecting flasks filled with gelatine to fracture by striking them or causing them to strike a solid object while swinging. His conclusions from these experiments were that the contrecoup phenomenon occurs only when the skull is freely movable or what is more often the case, when the skull as the moving body is suddenly stopped by striking something solid. The person who is thrown violently and strikes his head on the pavement is very apt to have

his brain injured at the pole opposite the point of impact. The writer cites four personal experiences in which this phenomenon was recognized clinically, in one of which exploration of the side opposite from the injury resulted in relief of symptoms and recovery of the patient.

The following practical use may be made of recognition of the frequency of contrecoup damage: (1) A knowledge of how the force was applied, and particularly if the head was the moving member, may enable the surgeon to give weight to contrecoup damage as a factor in explaining the symptoms present; (2) where symptoms of intracranial pressure fail to abate, or progress, after decompression, the cause may be hemorrhage from the opposite side of the brain, and not generalized cerebral edema, and a contralateral exploration may be justified. [Author's abstract.]

Foote, J. A. CRANIAL HEMORRHAGE OF THE NEW-BORN. [Am. J. Dis. Child., July, 1920.]

A constitutional hemorrhagic tendency forms the background in these cases. At least the author has so taught. The present paper deals with seven cases of intracranial hemorrhage observed during a period of fifteen months. All showed respiratory distress and cyanosis with or without muscular rigidity and twitching within twenty-four hours of birth. Lumbar puncture yielded blood-stained fluid varying from a deep to a light claret color and occasionally containing small clots. Both horse serum and thromboplastin were used hypodermically. Ten cubic centimeters were the amount injected, the horse serum being used in five cases. One child died; the remainder recovered. In only one case was lumbar puncture repeated. The six children appeared to be normal in every way on subsequent examination. These cases, because of the associated blueness and difficult breathing, are frequently confused with cases of atelectasis, cranial symptoms being absent or but slightly marked. The author urges the necessity for surgical and serum treatment in order to avert any after paralysis. Complete recovery may occur without treatment, however.

Fischer, O. CEREBRAL AND "UNILATERAL" FEVER. [Zeitschr. f. d. ges. Neur. und Psych., Vol. LXXVI, Nos. 1, 2.]

Fischer reports his observations upon a case of encephalitis lethargica with pronounced unilateral muscular restlessness (rhythmic convulsions) which also showed an elevation of temperature even more marked and manifesting itself at the appearance of decubitus. From these and a series of other observations he concludes that in paralytics, where there is no accompanying somatic disease, fever conditions are apparently due to an exacerbation of the paralytic process which is going on in the basal ganglia. One may assume increased heat formation upon the corresponding side. The fever is not connected with the muscular restlessness. This is further proved by a case of apoplexy without the muscular unrest. [J.]

Kampmeier, Otto F. COLLATERAL CIRCULATION FOLLOWING OCCLUSION OF THE SUPERIOR VENA CAVA. [Anat. Record, Nov. 20, 1920; Aust. M. J.]

A case of complete occlusion of the vena cava superior occurring in a negress of middle age who had suffered from syphilis and chronic mania is here recorded. Upon examination of the heart post-mortem the major portion of the right atrium as well as an extensive area of the aortic arch was found to be of a bony hardness. Upon opening up the heart the entire wall of the right atrium and the interatrial septum was composed of thick, compact, "osseous" tissue which had extended up through the anterior wall of the root and arch of the aorta and had invaded the atrio-ventricular septa and partly surrounded the tricuspid and mitral valves. This calcified tissue was 6 to 8 cm. in thickness. The only trace of the right atrial chamber was a passage leading from the vena cava inferior and coronary sinus to the tricuspid portal. As a result of this condition all blood returning from the body above the diaphragm (except from the coronary veins) was forced to descend to the abdominal cavity and enter the vena cava inferior, so that the direction of the blood stream in the azygos veins was the exact reverse of the normal. Much of the venous flow from the head and superior extremity flowed directly into the azygos and hemiazygos veins through the anastomosis of the right and left supreme intercostal and accessory hemiazygos veins with the innominate and vertebral veins. The remainder passed *via* the vena cava superior through the azygos vein in a reverse direction to the normal. Most of the blood entered the vena cava inferior by a pair of anastomoses just below the diaphragm close to the hepatic veins. The remainder of the venous return passed by way of the left renal vein and left first lumbar vein. Much of the superficial venous drainage of the thoracic wall was absorbed by the thoraco-epigastric and superficial and deep epigastric veins to be carried to the femoral and iliac veins.

Weve, H. A CASE OF HOMONYMOUS HEMIANOPIC CENTRAL SCOTOMA. [Psychiatrische en Neurologische Bladen, January-April, 1922, Nos. 1 and 2, p. 40 (3 figs.).]

A boxer and professional weight-lifter, twenty-seven, had always had poor vision, due to hypermetropic astigmatism. After correction the vision of the right eye was not quite as good as that of the left; and the right pupil was at times a shade the larger. After a slight trauma he said he could not see with his right eye; he became suddenly giddy and felt ill. At that time eyewitnesses said he looked dazed. The patient also described another trauma, this time to the left orbit, and he said he had a bluish spot. Yet another trauma he alleged took place. To rough testing his visual fields appeared normal. But continued examinations showed a peculiar form of bilateral homonymous hemianopia: there was no escape of the central region, and the hemianopia appeared to extend

upwards to the right to the periphery of the field. Bjerrum's method showed that there was a completely symmetrical remnant below. The limitation of the scotoma to the median line was perfectly sharp; by the ordinary perimetric method the boundaries for white and for colored objects corresponded with that determined by a strong illumination. In the course of some months the visual defect diminished, so that ultimately a hemianopic scotoma remained; the scotoma was absolute, and showed only on the left eye a relative peripheral cap of variable size. The optic discs remained unusually red; the writer regards this as physiological. By repeated examination he concludes that there was no hemianopic pupillary reaction (Wernicke's). The lesion is, he thinks, either in the geniculo-cortical radiation or in the left occipital pole. Cranial Röntgenology showed no abnormalities. There was a positive Sachs-Georgi reaction, and also a weakly positive Wassermann's. Anti-specific treatment was used for six weeks, and was then refused. A provisional diagnosis of late apoplexy of the left occipital pole, possibly on a basis of luetic vascular disease, is discussed. The type of visual field in this case is a very rare one; two cases of Förster are the only similar ones apparently. This visual field defect stands between the small central hemianopic scotoma and the complete hemianopia. It is just these intermediate forms, says Weve, that support Henschen's hypothesis that the central region of the retina has a similarly sharply bounded projection on the occipital cortex as that of the remaining areas of the retina. [Leonard J. Kidd, London, England.]

Quinan. SINISTRALITY AND MUSCLE COÖRDINATION. [Am. Arch. of Neur. & Psych., March, 1922, VII, No. 3; J. A. M. A.]

A study was made by Quinan of sixteen sinistral patients. Six admitted an unaccountable and capricious tendency to "bump into things." One is unable to "reverse" in waltzing. Of five who had studied instrumental music, two had made fair progress up to a certain point but considered that they had accomplished little for the outlay of time and money. Both are hampered by a defective sense of tempo and find "sight reading" an embarrassment. Two others abandoned the study of music because they were "unable to make any headway." The remaining one is a talented player but states that she still finds it difficult to "keep in time." Of these five musicians, two are left handed and left eyed, one is left handed and right eyed, and two are right handed and left eyed. Five patients are free from motor symptoms. These patients seem to show: (1) that sinistrals are especially prone to various forms of muscle incoördination, and (2) that in some of these persons both the sense of equilibrium and the sense of rhythm are defective. Hoping further to elucidate the subject, a study of sinistrality in skilled manual workers was carried out. Three series of 100 men each, classified as (1) professional musicians, (2) machinists, and (3) male inmates of a public relief home, were also examined. Four per cent of the machinists proved to be left

handed and an additional 4 per cent had sinistral peculiarities. In striking 8 per cent of left handedness was found among the musicians, while the lesser forms of sinistrality mounted to 24 per cent. It was evident from this research that left handedness and sinistrality usually are indicative of the psychopathic constitution.

Rogers, Fred T. CEREBRAL HEMISPHERE AND ARTERIAL BLOOD PRESSURE AND BODY TEMPERATURE REGULATION. [Am. Arch. Neur. & Psych., August, 1920.]

Removal of cerebral hemispheres in the pigeon, leaving the thalamus intact and body temperature normal, leads to a constant fall in arterial pressure of from 10 to 20 per cent. The fall comes on immediately and persists for as long as seventy-five days after operation. Removal of the hemispheres and thalamus leads to loss of temperature regulation, and usually to a slightly greater fall in arterial pressure than does loss of the hemispheres alone. The poikilothermous condition that follows deep lesions of the brain stem is not due to changes in the arterial blood pressure alone. [Stragnell.]

Shimoda, M. ABORTIVE CEREBRAL SCLEROSIS. [Mitteilungen a. d. Path. Inst. Univ., May, 1921, I, No. 2.]

A pathological account of a localized focus of cerebral sclerosis giving rise to a clinical picture of an epilepsy.

Shaklee. EATING AND DRINKING REFLEXES AND BRAIN EVOLUTION. [Am. Journ. of Phys., February 1, 1921, LV, No. 1; J. A. M. A.]

A study was made by Shaklee of the eating and the drinking reactions of three pigeons after cerebral ablation, one for seven weeks, one for nearly five months, and the other for almost twelve months. An attempt is made to show how use and disuse may be potent factors in determining the location of brain centers, and certain laws of brain evolution and of education, suggested by the findings in the light of present-day knowledge, are tentatively formulated. The findings are made the basis of a new statement of the functions of the cerebrum and of the subcerebral brain.

Willemse, A. A CASE OF ACUTE CEREBRAL TREMOR. [Nederland. Tijdschr. voor Geneeskunde, April 8, LXVI, p. 1433.]

Acute cerebral tremor is a relatively rare condition that occurs in infants during the first year of life or a little later. All the hitherto recorded cases have recovered. Usually the tremor develops rather acutely about two to four weeks after some slight or severe infection, such as measles, bronchitis, bronchopneumonia, or acute gastric or intestinal disturbances. It consists of large excursions of the muscles of the limbs and neck without any nystagmus or tremor of the muscles of eye, face, or tongue. The movements persist during sleep. There is no paralysis, and the temperature, appetite, and excreta are normal. The

tremor disappears gradually, without treatment, and in from two weeks to three months complete recovery takes place. The writer's case was a girl of nine months; tremor appeared a month after an attack of cholera infantilis; it began in the right hand, arm, and head, and then spread to all the limbs. It was moderately quick, with large excursions in the peripheral parts of the limbs, but less in their proximal segments. It increased during psychical emotion, and persisted during sleep. The knee-jerks were rather lively. A peculiarity was the presence of extreme hyperesthesia; the slightest touch evoked screams. (There was a small epidemic of Heine-Medin disease in the neighborhood at that time.) In three months complete recovery was seen. The tremor ceased first during sleep, and then at noontide. No treatment was used. The writer does not think the case was one of lethargic encephalitis, for in none of his cases of that disease—whether the acutely fatal ones or those which showed the thalamic syndrome—was there ever a trace of any hyperesthesia. Rather, from a clinical point of view, one inclines to regard the hyperesthesia as an expression of the Heine-Medin disease. [Leonard J. Kidd, London, England.]

Aguilar. LITTLE'S DISEASE. [Arch. Españ. d. Ped., November, 1920, IV, No. 11; J. A. M. A.]

This clinical discussion controverts a number of neurological orthodoxies. In the first place he maintains that the spasmodic movements are not the result of lack of inhibiting control from the brain. The medulla does not require inhibiting influences from the brain, and furthermore no such influence on this organ is made by the brain. Motor disturbances result, in medulla lesions, corresponding to the elements involved. When the anterior portion is involved there is a flaccid palsy and contracture when the posterior portion is implicated. Little's disease is essentially a hyperactivity of the motor tract; contracture is an extreme form of this activity. Treatment should refrain from excitement; no rubbing, no massage, no electricity, no training exercises. Repose and passive correction of the abnormal positions of the limbs affected, with potassium bromid, should be the main reliance. The ankle, knee, and hip joint should be gently and repeatedly extended to straighten out the limbs as much as possible, and the correction thus realized should be maintained with a padded dressing. A week later they should be slightly flexed, and if necessary a splint applied to hold the correction. After a week's interval the flexion should be exaggerated, and so on, placing something between the knees to combat adduction.

Wilson, S. A. K. STUDY OF APHASIA. [Lancet, December 3, 1921, II, No. 5127.]

Aphasia as here discussed is made a part of a wider cerebral syndrome, namely, apraxia and agnosia. Aphasia, considered a disorder of symbolic thinking, may reveal itself where no words, as such, are involved. Yet

unless some explanation such as that provided by the conception of apraxia and agnosia is offered, the limits of aphasia proper are impossible to outline. A patient who dresses himself wrongly or makes mistakes or "short-circuits" in performing any act, such as lighting his pipe, shows a disturbance which cannot by any legitimate means be regarded as aphasia; the disorder is certainly one of agnosia or of apraxia.

Lhermitte, J. DECEREBRATE RIGIDITY IN MAN. [Annales de Médecine, 1920, X, No. 3; J. A. M. A.]

Lhermitte reviews the recent literature on this subject and discusses the physiologic data and clinical applications. The war has thrown much light on the release of function in the nervous system when the brain is shut off.

Dandy, W. E. IDIOPATHIC HYDROCEPHALUS. [Johns Hopkins Hosp. Bulletin, March, 1921.]

In studies of the author on the absorption of cerebrospinal fluid in hydrocephalus, it was found that in that type where all the ventricles communicated the absorption from the subarachnoid space was reduced. Reduction in the amount of the absorbing spaces was thought of as the cause. Four cases of communicating hydrocephalus were studied. In each adhesions were found which obliterated the cisterna. These adhesions, by preventing the cerebrospinal fluid from reaching the great absorbing spaces had caused the hydrocephalus. Communicating hydrocephalus is due to an obstruction in the cisternae, as is shown: (1) Communicating hydrocephalus can be produced by blocking the cisterna. (2) The obstruction can be demonstrated by injecting a suspension of India ink into the spinal canal; the color stops abruptly at the obstruction. (3) In the living the obstruction can be shown clearly by cerebral pneumography after air has been injected into the spinal canal; the air also stops at the obstruction, and can be outlined sharply in the roentgenogram. The obstruction in the subarachnoid space is most frequently located in the mesencephalic or pontine cisterna. The obstruction may be in the large branches which carry the fluid from the cisternae chiasmatica and interpeduncularis to the cerebral sulci. Any number of these branches may be occluded. If all the main branches are obstructed, the hydrocephalus will be the same as if the occlusion were in the cisterna. If some of the branches remain unobstructed, the degree of hydrocephalus will be modified proportionately; a complete cure may even result because of the absorption which takes place in the remaining patent areas of the subarachnoid space. Adhesions, which follow meningitis and occlude the cisternae, cause the vast majority of cases of communicating hydrocephalus. They also cause many cases of obstructive hydrocephalus by blocking the foramina of Luschka and Magendie. Adhesions give infallible proof of a preëxisting meningitis. In two cases the hydrocephalus appeared to be due to a congenital failure of the cisternae or of its

branches to develop. Tumors in the pons, medulla, or midbrain also produce partial or complete obstruction of the subarachnoid space and therefore cause communicating hydrocephalus. Pneumographic records are shown demonstrating the existence of a very early stage of communicating hydrocephalus, the cause of the hydrocephalus, the reason for its unusually tardy development, and for its spontaneous arrest.

Parry, E. J., and Williamson, O. K. A PROBABLE CASE OF CEREBRAL VENTRICULAR HEMORRHAGE, ASSOCIATED WITH MARKED AND PERSISTENT CONVULSIONS.

The following case of a general convulsive seizure ending in death appears worthy of record on account of (1) the persistence and intensity of the convulsions, and (2) the diminution in the depth of unconsciousness, with a subsequent relapse into complete coma followed by death.

At 11:30 P.M. on March 14, 1920, Parry was summoned to see a gentleman, forty-five years of age, who, it was stated, had immediately before been taken suddenly with a fit whilst indulging in a warm bath. Dr. Williamson was called in in consultation, arriving at 12:30 A.M. on the 15th, and found the patient unconscious, the face being pale and livid. Nervous system: There was a condition of marked general tonic rigidity; this, however, soon changed to a general tonic spasm in which the left forearm was flexed, the right arm being extended, and there being rolling and stretching movements with the fingers of the right hand. Lower extremities extended. Mouth slightly open; the tongue was alternately protruded and retracted. The pupils were equal and somewhat dilated; the corneo-conjunctival reflex was abolished on each side. Cardio-vascular system: Heart normal; pulse full and somewhat rapid, to the finger not of high tension; the palpable arteries were neither tortuous nor thickened. The respiration was stertorous, the tongue clean. After a time the degree of unconsciousness diminished and the patient uttered inarticulate sounds. At about 1:30 A.M. the rigidity was distinctly less, and the spasm, having alternately increased and diminished, had by now decreased; the color of the face was better, and he passed a very offensive motion. At about 2:30 A.M., when the doctors left the house, the patient certainly seemed not so completely unconscious as before, and the pupils had become normal in size and the respirations quieter. At 8 A.M., however, Dr. Parry, having been again sent for, the patient had relapsed into complete unconsciousness, the right pupil was dilated, the left minutely contracted, he was completely paralyzed, and death ensued soon after 9 A.M.

The diagnosis up to the termination of the first visit was a severe epileptic seizure, but the subsequent course and fatal issue would seem to point to a hemorrhage from a branch of the middle cerebral artery with rupture into the ventricle. No question of poisoning arises, though possibly uremia cannot be absolutely excluded. Unfortunately no necropsy was obtainable.

A history was obtained from the patient's wife that on three previous occasions (the last time a year before) attacks had occurred, each of which necessitated a day's rest in bed, which the medical man attending diagnosed as epilepsy. [Author's abstract.]

Lellis, A. ENDOCRINE HEMIPLEGIA. [Brazil Medico, October 8, 1921, II, No. 13.]

Two cases of flaccid paralysis are here reported as occurring in adults, developing suddenly with loss of the heat, pain, and tactile sensibility and, in one, abolition of reflex movements. There was nothing to indicate cerebral hemorrhage, and parathyroid extract was given. Improvement was pronounced in one or two days and continued to almost complete recovery, only a slight heaviness in the limbs on that side in the male patient. Ovarian treatment was then given to the woman, and complete recovery followed. She was of an infantile type, with various signs of endocrine insufficiency, and had never menstruated.

Schippers, J. C. ACUTE CEREBRAL TREMOR. [Nederlandsch Tijdschrift voor Geneeskunde, January 29, 1921, 591.]

Schippers reports two cases of acute cerebral tremor in infants, aged ten and fourteen months, respectively. The tremors, which were connected with a croupous pneumonia, lasted for some weeks; in the one case they were of fine amplitude; in the other, of larger. They persisted during sleep, and were increased on emotion; gradually they disappeared. The clinical picture of this acute cerebral tremor we know from the writings of Zappert (1909), who collected cases from the literature and published original ones. We have to do here with a toxi-infectious cerebral disturbance. While the prognosis is in general good, yet, as in one case permanent cerebral symptoms were present, some prognostic reserve is always desirable. [Leonard J. Kidd, London, England.]

Roger and Reboul-Lachaux. VISUAL AURA WITH BRAIN LESION. [L'Encéphale, December, 1921, XVI, No. 10.]

In this clinical study of a man of forty-five with old slanting homonymous hemianopsia there were epileptic seizures which were invariably preceded by a brief period of blue vision in the blind area of the visual field. These auras seemed at times to be seizure equivalents.

Wachendorf, K. CEREBRAL PARALYSIS IN CHILDREN. [Mitteil a. d. Grenzgeb. d. Med. u. chir., 1921, XXXIV, No. 1.]

Epileptiform and choreiform movements in children who have had various types of cerebral palsies are here studied by the author. In three cases in boys of ten or twelve he operated. One died in status, without regaining consciousness, a week after the operation. The others were improved. In these the paralysis had been noted from birth; in one, birth trauma was evidently responsible. In sixteen of Gowers' twenty-six

cases the children were the first born; in six others the head had been born last, and in three of the other four the previous deliveries had been difficult, the children being stillborn or paralyzed. Wachendorf reviews the literature and discusses the theories advanced. The chances of improvement from operative measures are slight. In the traumatic cases, trephining usually comes too late to prevent irreparable injury. But if epilepsy develops from the traumatic cerebral paralysis, it should be treated on the same principles as traumatic epilepsy in general. Tilmann has compiled cases showing 18 per cent cured in jacksonian and traumatic epilepsy, and one patient with genuine epilepsy has been cured for a year to date since the focus of softening in the left temporal lobe was drained.

Howe, Hubert S. CORTICAL WORD BLINDNESS. [Neurological Bulletin, February, 1921, Vol. III, No. 2.]

The case described was that of a right-handed man, aged fifty-five, who had complained of an inability to read for three weeks. He had had no previous serious illnesses. He felt entirely well until one evening on retiring he had a feeling as though he were smothering, which caused severe discomfort when he lay down but was relieved when he sat up. The condition was so severe that for three nights he did not attempt to lie down, but remained seated in a chair. On the morning following the attack he noticed that he could not read the newspapers or any other printed matter, although he could see perfectly. He attended a moving picture performance and was unable to read the titles of the pictures though he understood the movements of the actors and the scenes they portrayed.

Physical examination revealed auricular fibrillation but no signs of cardiac decompensation. There was no abnormality on neurological examination except that disclosed by the tests for aphasia. There was no hemianopsia.

The tests for aphasia were as follows: (1) *Can he speak spontaneously in ordinary conversation?* Yes. (2) *Can he enumerate and denominate objects?* Yes. (3) *Can he speak from dictation?* Yes. (4) *Can he read aloud?* Most of the letters of the alphabet were recognized correctly. He was unable to read words without spelling them, and in long words, even when he read the letters correctly, he would become confused and was either unable to recognize the word or would misread it. The following words he spelled out loud and pronounced according to the sound of the spelling:

We	"W-e, We"	By	"B-u, Bu"
Up	"U-b, Ub"	Bad	"B-a-4th letter of al- phabet"
God	"G-o-n, Gone"	Him	"Hil"
June	"J-u-n-e, June"	Farm	"F-a-b-e, Fib"
Water	"W-a-t-e-r, Waiter"		

In spelling out long words he frequently became confused, and when he reached the last letters had forgotten the first ones, so that he could not read the word. Sometimes he read only the first two or three letters, supplying the remainder of the word with anything that came into his mind.

Toward, "T-o-w-e-r, Tower"; Foremost, "Forrest"; Gertrude, "G-r-e-a-v-e-r"; Underwear, "Underworld."

The following words and sentences were shown to him to see whether he would read the words spelled incorrectly the same way that he read those spelled correctly. He did this in almost every instance, in no case recognizing errors in spelling:

Sope, "Soap"	Soap, "Soap"
Krist, "Christ"	Christ, "Our Saviour"
Mannhatan, "Matron, Lady of the House"	Manhattan, "The same"
I hav a blak kow	"I have a black cow"
I have a black cow	"I have a black calf"
I la briks	"I lay bricks"
Giv me a nif	"Give me a knife"

Reading of figures: 7—"Seven"
65—"Thirty-five"
489—"Four hundred and eighty-six"
3962—"Three thousand three hundred sixty-four"

(5) *Can he read to himself and understand what he reads?* He could not read to himself as readily as aloud. All words had to be spelled before they could be recognized. Any words that could be read were understood.

(6) *Can he write spontaneously?* Spontaneous writing was very difficult and almost illegible. Spelling was very poor. Being asked to spell the names of his wife and children, he did so as follows:

Gertrude, "G-u-r-t-r-u-d-e"	George, "G-o-r-g-y"
Edward, "E-d-w-a-r-d"	Mabel, "M-a-b-b-l-e"

(7) *Can he write from dictation?* His attempts to write from dictation were no more successful than his spontaneous writing.

(8) *Can he enumerate and denominate in writing?* He wrote the figures from 1 to 10 quickly and easily. The addition of two or three single figures of one denomination could be done correctly. More complicated addition could not be done at all. He was practically unable to multiply, failing in 2×10 , 32×83 , and 26×83 , although the last two multiplications were found correctly figured by him in a time book he had used before his illness commenced.

On being told to write the names of objects shown him, for pocket-

knife, hat, and bottle he laboriously wrote what appeared to be "nife, hat, bottel."

(9) *Can he copy written and printed matter?* He was able to copy printed words but unable to copy written matter.

(10) *Can he hear and understand what he hears?* Yes, perfectly.

(11) *Can he see and understand what he sees?* Yes, he recognized pictures of animals, houses, a barber pole, etc.

(12) *Is he aware of errors made in speech or writing?* He made exceedingly few mistakes in speaking, certainly no more than anyone of his education. He was not aware of errors made in writing, and could not read what he had written.

(13) *Has he a concept of speech?* He could not give the number of letters in simple words except by spelling them and counting the letters on his fingers. He did not understand what was meant by a syllable.

(14) *Does he misuse words? Is he ungrammatical out of proportion to his education?* Words were not misused, nor was he ungrammatical out of proportion to his education.

The case belonged to the group of so-called cortical word blindness where word blindness is associated with agraphia. The lesion was probably located in the white matter of the angular and supramarginal gyri, but not extending deeply enough to involve the optic radiation of Gratiolet. [Author's abstract.]

Duret, H. CONCUSSION OF THE BRAIN. [Revue Neurologique, 1920, No. 9.]

There are some cases of head injury in which the cranium alone sustains the whole force of the blow and which are not associated with concussion. This is chiefly observed in cases of compound comminuted fracture. Conversely, under other circumstances the skull proves wholly resistive and the brain sustains the blow. Here there are signs of concussion and cerebral lesions may or may not be found. In a certain number of concussions with intact skull death occurs without any apparent lesion of the brain substance. In such cases it would at times appear that precise new histological examination of the mesencephalon and bulb might disclose lesions. In fatal cases alterations in the respiratory, vagal, or vasomotor centers are frequent. Pure and simple concussion as a cause of death seems to be rare. A certain number of cases of cranial injury, the result of apparently moderate violence, with no signs of concussion, are accompanied by grave and rapidly fatal intracerebral hemorrhages.

van Woerkom, W. DECEREBRATE RIGIDITY IN AN INFANT. [Nederlandsch Tijdschr. voor Geneeskunde, September 17, 1921, LXV, 1500.]

A case of decerebrate rigidity in an infant was demonstrated by the author. Normal growth, walking, and talking till three or four months ago. Then, without any attack or fever, gradual loss of power in limbs.

and increasing rigidity. Maximal opisthotonos, arms adducted, elbows extended, and hands pronated; during the last few weeks tendency to flexion of elbows; lower extremities extended at knees and ankles. Loss of the facialis menace-reflex. Occasional outward conjugate eye-movements, but no following of a light; no evidence of hearing power. Pupils react to light; no definite optic neuritis. At first, vestibular reaction to cold water present (at any rate on left), but later was absent. No changes of muscle tonus on raising and lowering the infant. But a definite neck-reflex is present. When the head is drawn to the left the right arm becomes flexed; this returns to extension on drawing head to right. Olfactory stimuli give jaw and swallowing movements, but particular qualities of odors do not produce special facial movements; taste stimuli resemble olfactory in both these points. Bilateral Babinski, with plus reflexes. No purposive response to cutaneous stimuli. The condition of this child corresponds to the experimental decerebrate rigidity of Sherrington. In man it has to be diagnosed from the neck-stiffness of meningitis. In this infant meningitis was excluded by the results of lumbar puncture, the absence of flaccid palsies, and the absence of Kernig's sign. The Wassermann was positive, but anti-luetic treatment was tried without benefit. Possibly in this case there are various sclerotic processes at work in the cerebral hemispheres and also in the pyramidal paths, so that the influence of the cerebrum is eliminated. In syphilitic children who show decerebrate rigidity encephalitic processes are often active. [Leonard J. Kidd, London, England.]

Wilson, S. A. Kinnier. DECEREBRATE RIGIDITY IN MAN. [Brain, 1920, Vol. XLIII, Part 3; Aust. M. J.]

This observer draws a comparison between the experimental decerebrate rigidity of animals (following transection of the brain stem at the mesencephalon, which is equivalent to removal of the cerebral hemispheres), and cases in man "in which there is evidence of withdrawal of cortical control in the form of unconsciousness or semiconsciousness, the result commonly of cerebral hemorrhage or of meningeal inflammation or from the effect of certain intracranial tumors; also for that matter of hysteria. Coupled with this impairment of consciousness has been the appearance of tonic rigidity of trunk and limbs, minutely resembling decerebrate rigidity, to which frequent exacerbations in the form of tonic or postural fits, accentuating and aggravating the background of tonic posture, are superadded." The first five cases described comprise a tumor of the frontal lobe, a tumor of the mesencephalon, a case of general suppurative meningitis, a case of cerebral hemorrhage bursting into the lateral ventricles, and a case of tuberculous meningitis. In each the decerebrate posture was reproduced with the exactness of a physiological experiment, in each the onset of tonic fits merely accentuated the already existing posture, showing that tonic fits are in reality attacks of decerebration, and in each the absence of clonic element was of much signifi-

cance. There follows an account of cases of decerebrate rigidity without tonic fits and cases of tonic fits without persisting decerebrate rigidity and then cases of decerebrate rigidity in conscious life are described. It is pointed out that tonic or "cerebellar" fits may occur, in which the decerebrate posture is temporarily assumed, and attention is drawn to the position in hysteria of opisthotonos with extension of the legs and extension of the legs and arms, as a well-recognized phenomenon. Finally, there are cases which present a unilateral or fragmentary decerebrate attitude in one limb only. Not only may the decerebrate attitude of the head in certain conditions be so explained, but the extreme pronation of the hand seen in athetosis or chorea may be such a fragment. The writer has drawn upon the classical work of Hughlings Jackson, Sherrington, Graham Brown, and others, in concluding that the mesencephalon is chiefly responsible for the maintenance of the decerebrate posture and that integrity of the red nucleus and its connections is of special importance.

Vaglio, R. INFANTILE SPASTIC HEMIPLEGIA. [La Pediatria, March 15, 1920.]

Forty-six cases of hemiplegia which were observed at the Naples University Pediatric Clinic between 1913 and 1918 make the foundation of this clinical paper. One was due to trauma at birth, in 25 syphilis could be established (in 19 with certainty, in 6 with great probability), in 3 the cerebral lesion was connected with measles, 4 were associated with pertussis, influenza, typhus, and empyema respectively, and in 12 the origin could not be determined. A certain proportion of the latter were possibly due to Heine-Medin's disease, and in others the possibility of a cerebral lesion of tuberculous nature could not be excluded. In 26 cases the paralysis was preceded and generally accompanied by convulsive attacks often of a definitely epileptic character. The lesion affected the two limbs almost equally in 16 cases; in 22 it was most pronounced in the upper limb, and in 8 in the lower limb. In 27 cases the right side was affected, and in 19 the left side. Only 6 cases were associated with mental disturbances, which varied from the severest forms of idiocy to a mere retardation in intellectual development. In 2 cases athetotic movements were present, and in 1 choreic movements of the affected limbs. In 2 cases there were ocular lesions. The onset was sudden in 29 cases and gradual in 16.

Besta, C. MANIFESTATIONS FROM PILOCARPIN IN BRAIN LESIONS. [Riforma Medica, June, 1921, XXXVII, No. 24; J. A. M. A.]

Besta had occasion to inject pilocarpin in 200 cases of wounds of the brain. He found that the drug induced characteristic symptoms according as the injury was in different areas and at different depths. He therefore calls attention to this harmless and simple means for revealing the existence of lesions in the brain, and localizing them, possibly in the absence

of all other diagnostic findings. His research revealed a scope of influence from pilocarpin on the autonomic vegetative system beyond anything previously suspected. The findings confirm those obtained with ether in cases of cerebral injury; spasms and contracture occur, with exaggeration of the reflexes, when ether is given after a brain wound. The pilocarpin induced tremor of one arm, or jacksonian epilepsy, or lacrimation or salivation, exaggeration of reflexes or other manifestations, the type differing with the site of the lesion, as he explains in detail.

Fiebig, M. INFANTILE PSEDOBULBAR PARALYSIS. [Archiv für Kinder., February 1, 1921.]

Nearly 3 per cent of 600 patients applying in the past two years at the Charité for speech difficulties were found to have pseudobulbar palsy. Three were adults between twenty-four and twenty-six. One wrote what he had to say because of his difficulties. By pressing the lips together with his hands he could pronounce the letter "p." An operation had been done on his jaw on the assumption that it was deformed. Fiebig says that in such cases the mind is not affected, although the patients produced the impression of imbecility. Paralysis of the soft palate produces the nasal tone. The prognosis is generally good. The focus of degeneration being in the cortex, there is no atrophy of muscles. The dysarthria is the main symptom. The affection escapes detection as the child is classed with the feeble-minded, yet it is quite frequent. An aviator was left with injury of the meninges, after a fall, and disturbances in speech resembling those with infantile pseudobulbar paralysis, which throws light on the nature of infantile pseudobulbar paralysis.

Paoletti, G. PRESSURE IN CEREBRAL HEMORRHAGE. [Riforma Medica, January, 1920, XXXVI, No. 1.]

Paoletti queries, Why in the elderly does hemorrhage occur in the brain and not in the vessels of the viscera or limbs? Some special condition in the brain must be present, he argues. The brain vessels are subjected to a constant pressure from the cerebral fluid. It is possible that when this pressure is less than usual, the vessel walls stretch as they are released from the usual pressure, and, as they stretch, they rupture. This assumption of released pressure hemorrhage explains the facts observed, but suggests that when symptoms indicate impending cerebral hemorrhage or minute extravasation has already occurred, intraspinal injection of a little artificial serum might restore the normal intracerebral pressure, and thus ward off future injury from this source. He thinks that at least it is worth a trial in institutions for the aged, in treatment and in prevention of apoplexy.

Stein, C. THE EAR AND CEREBRAL ARTERIOSCLEROSIS. [Zeits. für Klin. Med., Berlin, 1920.]

A careful clinical study of arterial sclerosis in the cerebral vessels based on a study of over 1,000 cases paying particular attention to the ear.

In the majority the ear disease overshadowed conditions elsewhere. The symptom for which the internists sent the patients to have the ears examined was vertigo. Stein found it possible by repeated examinations to detect and trace the progress of the arteriosclerosis. Tinnitus is especially instructive. It may occur at intervals or continuously, but in the course of perhaps many years organic disease of the auditory nerve becomes manifest. The complete failure of all treatment of the tinnitus indicates actual organic injury in the domain of the auditory nerve. Among the numerous instructive points brought out by his research is that with vasomotor changes the hearing may fluctuate, while with arteriosclerotic changes the findings are more uniform.

Milian, G. FRONTAL COMA. [Paris Méd., October 2, 1920.]

Coma from frontal lesions rarely causes any impairment of the sensory function. Natural sleep is simulated, the pulse is small. The corneal reflex is usually present.

Shellshear, J. L. THE BASAL ARTERIES OF THE FOREBRAIN AND THEIR FUNCTIONAL SIGNIFICANCE. [J. Anat., 1920, LV, 27; Medical Science.]

Following the observations of Duret and of Beevor, it is commonly held that the claustrum and the external capsule receive their blood from those branches of the middle cerebral artery which supply the cortex of the insula, and not from the basal branches of this artery, and further, that there is no communication between the basal branches to the lenticular nucleus and the cortical arterioles supplying the claustrum. By a modification of Beevor's injection method, Shellshear finds that there is a series of fine arterial vessels, the claustral arteries, which arise lateral to the lateral striate branches of the middle cerebral artery and supply the claustrum and external capsule. They perforate the surface of the brain at the limen insulae lateral to the anterior perforated space, and therefore lie in series with the lateral striate arteries mesially, and the cortical branches to the insula laterally. Like the other basal arteries, they are end-arteries and do not anastomose with the mesial or the lateral members of the series of which they form the middle member. Nevertheless, there is a capillary communication with both sets. Shellshear finds no vessels of the lateral striate group passing to the thalamus, and thinks that the name lenticulo-optic artery should be discarded. At the anterior perforated spot he finds an average of from eighteen to twenty perforations. These are arranged in two rows running laterally posterior to the lateral olfactory stria. The anterior row receives branches of the anterior cerebral artery, the posterior row and a clump of five or six perforations at its lateral extremity receive branches of the middle cerebral artery. Laterally again to these are the fine perforations which receive the claustral branches of the middle cerebral artery. The anterior cerebral artery gives off a recurrent branch, which runs back and then

laterally to the outer end of the anterior perforated space, which it perforates near the group of lateral striate arteries. Shellshear says that "It is of interest here to observe the angles at which these vessels come off from the anterior and middle cerebral arteries . . . the larger the vessel entering the substance of the brain, the more acute is the angle it makes against the direction of the current; and to attain this end both sets from the anterior and middle cerebral arteries leave the parent trunk at a considerable distance from the place of entry into the anterior perforated space." According to Shellshear, John Hunter alone mentions this peculiarity of the cerebral arteries. Shellshear points out that the distribution of the cerebral arteries is very precise. It is clear from Sachs' observations upon the nuclei of the thalamus that its subdivision into functional nuclei very closely coincides with the areas of blood vascular supply as determined by Beevor and by Shellshear. There is a similar functional relation between the posterior cerebral artery and the visual cortex, while Stopford's observations on the blood supply of the pons and medulla point in the same direction. Shellshear suggests that a good experimental test of the function of a given area of brain might be obtained by cutting off the blood supply to that area, and he concludes that the cerebral arteries are laid down in definite relation to function, and that their distribution follows phylogenetic and ontogenetic laws. He thinks that such a functional arrangement of blood supply is well adapted to regulate the activities of a particular function.

Dide and Guiraud. SPECIAL STAINING METHOD FOR LIPOID GRANULES IN NERVE CELLS. [Rev. neurol., 1920, XXVII, 1124; Medical Science.]

The method is applicable to alcohol or formalin fixed tissue in paraffin sections.

(1) Stain for a minute in a freshly prepared solution of methyl-violet grms. 0.5 in 100 c.c. of anilin water.

(2) Then fix for a minute in a solution of iodine grms. 5.0, potassium iodide gms. 5.0 in 150 c.c. of distilled water.

(3) Decolorize in 90 per cent alcohol, and then in acetone until no more blue or iodine comes away from the section.

(4) Wash in distilled water.

(5) Counterstain in 0.5 per cent eosin solution.

(6) Dehydrate and mount in neutral balsam.

Lecéne, P., and Lhermitte, J. CEREBRAL SOFTENING FROM A METALLIC EMBOLUS IN THE LEFT MIDDLE CEREBRAL ARTERY. [Rev. neurol., 1920, XXVII, 1116; Medical Science.]

The patient, a healthy soldier of thirty years, received multiple small shell wounds on August 31, 1918. Included among these was a small punctured wound below and behind the left angle of the jaw. When observed on the same day the patient's grave condition was in striking contrast to the trivial nature of his external injuries. He was semi-

conscious and had a rapid feeble pulse of 140 per minute. He answered questions by an inarticulate grunt, and the most that could be elicited from him was the repeated phrase "fait mal." There was no true paralysis, but slight rigidity of the right arm was noted. On the following day he was unable to utter a word; there was complete aphasia. He appeared to comprehend what was said to him perfectly. The slight rigidity of the right arm noted earlier persisted, but did not interfere with voluntary movement of the limb. There were no local signs of a wound of the carotid artery. On the third day (September 3) there was a complete right hemiplegia, with flaccidity of the paralyzed limbs and loss of tendon-jerks on the right side. The right plantar response was of Babinski type. Complete aphasia remained. On the three following days the patient's general condition grew steadily worse. He was somewhat delirious, the right hemiplegia persisted, the patient was speechless, but could close both eyes to order. He died on September 6.

Autopsy revealed lobar pneumonia of the right lung and a small punctured wound of the internal carotid on the left side just above its point of origin from the common carotid artery. The artery was normal elsewhere. The anterior cerebral artery and the circle of Willis were normal. On opening the left Sylvian fossa, a black speck became visible on the middle cerebral artery three centimeters from its junction with the circle of Willis. The artery was found to be completely occluded here by a small shell fragment. Distal to this, the artery and its branches were thrombosed. The other vessels were normal. On horizontal section, the left centrum semiovale in its middle segment was softened and diffuent, livid in color, with several hemorrhagic areas. The external part of the head of the caudate nucleus and the two external segments of the lenticular nucleus were also softened and bluish in color. The external medullary lamina and the external capsule were not recognizable, being replaced by a cavity. The insula and all the cerebral convolutions were normal. The thalamus appeared normal. Microscopically, the frontal convolutions were normal both as regards blood vessels and cells. The Rolandic convolutions showed no vascular lesion, but the cells of Betz were in a state of chromatolysis. There was some edema of the cortex of the insula and some diapedesis round the vessels. In short, the cortex was relatively little altered. The thalamus was also virtually intact, and, beyond excess of lipoid granules in the cells, was normal. The caudate nucleus was altered throughout its whole extent. Numerous veins were thrombosed, there was hemorrhage from the capillaries, and the nerve cells were grossly degenerated. The putamen was completely necrosed and its vessels thrombosed. In the external segment of the globus pallidus there were numerous capillary hemorrhages and edema. The nerve cells were relatively intact. In the internal capsule the fibers were separated by edema, but were otherwise normal. Numerous compound granular corpuscles were seen here.

In their commentary on the case, Lecéne and Lhermitte note the initial

absence of localizing symptoms, then the appearance of complete aphasia without signs of hemiplegia except for the trivial change in tone in the muscles of the right arm for twenty-four hours. Not less striking was the absence of definite evidence of a wound of the internal carotid artery in the neck. The severity of the general cerebral symptoms, the rapid development of aphasia, hemiplegia, and death from a small metallic embolus, the entry of which was missed during life, suggest that some at least of the fatal cases said to be due to shell explosion without wound may have a similar origin. According to the authors, it is in connection with the question of the cerebral arterial supply that the case has its greatest interest. Contrary to what some observers have stated, the cerebral cortex obtains its blood supply from a network in the pia formed by branches of all three cerebral arteries. So free is the anastomosis between the branches arising from the three parent arteries, that obliteration of one of these scarcely affects the blood flow through the network. If, as in a young subject, the vessels are healthy, obliteration of one of them does not lead to an appreciable lesion of the cortex. This is well seen in the case here recorded. The basal arteries, on the other hand, are strictly terminal. They arise from all three cerebral arteries and from the anterior cholid and communicating arteries. Blocking of a single set, such as those arising from the middle cerebral artery, should give rise to a well-defined area of softening. After shortly reviewing the various statements as to the blood supply of the basal ganglia (Beever, Heubner, Charpy), the authors point out that in their case, from blocking of the basal vessels arising from the middle cerebral artery, there resulted softening and complete necrosis of the putamen, external segment of globus pallidus, and of head and middle part of caudate nucleus. The internal capsule was merely edematous and contained numerous granular corpuscles, and the thalamus was intact. In short, the middle segment of the centrum semiovale was necrosed, and on this lesion the hemiplegia depended.

3. BRAIN, MENINGES, SINUSES, TRAUMA.

Pace, D. INFLUENZAL MENINGO-ENCEPHALITIS. [*Riforma Medica*, February, 1920, XXXVI, No. 6.]

This clinical report is of two cases. The first was one of coma and fever occurring in a man forty-one years of age who had had an influenza four months before and had not made a good recovery. Acute congestion in brain and meninges was symptomatically expressed. Venesection was of no service, but lumbar puncture on the fourth day seemed to arrest the process. A second, with marked delirium and fever, yielded in the same way to lumbar puncture. Lymphocytosis was marked in the C.S.F. His diagnosis was influenzal meningo-encephalitis. The involvement of the brain in influenza, he says, is rare. [This is not so if the literature of the epidemics since 1200 are carefully read.]

Étienne, G. SERUM TREATMENT OF TUBERCULOUS MENINGITIS. [Rev. Méd. de l'Est., March 1, 1920.]

This case of tuberculous meningitis was treated by lumbar puncture and intrathecal injections of Vallé's antituberculous serum. The author says that although death occurred, there were indications of a reaction which was promising. Decided improvement followed the injections. The most striking results were, however, the disappearance of tubercle bacilli from the cerebrospinal fluid, and the diminution of the meningeal reaction, shown by progressive fall in the number of the lymphocytes (from 8 to 4) and of the albumin content (from 0.80 to normal) in the C.S.F.

Foti, P. TREATMENT OF CEREBROSPINAL MENINGITIS. [La Pediatria, April 1, 1920; B. M. J.]

P. Foti treated with anti-meningococcic serum 22 cases in children aged up to twelve years. There were 13 recoveries, 5 deaths, and 4 cases in which the result was not ascertained. On subtraction of the latter the mortality was reduced to 22 per cent. In the majority of the cases the effect of the serum was immediate, the cerebrospinal fluid becoming less turbid after the first few injections, and lymphocytosis replacing polymorphonucleosis, with simultaneous disappearance of meningococci. The serum was most beneficial when used early, but even in advanced cases in which it was not employed till the fortieth or forty-seventh day excellent results were obtained. The amount of serum injected varied from one case to another; as a general rule four to five injections of 20 c.c. were sufficient. The mortality was highest in infancy.

Eiras, F. FULMINATING OTOGENOUS MENINGITIS. [Rev. Medico-Cirurgica do Brazil, September, 1920; J. A. M. A.]

Eiras' fourteen cases confirm the frequency of meningitis from this cause, and the danger of its nonrecognition. In one case a physician had been unjustly arraigned, and the day he should have appeared in court he died suddenly. No one knew he was sick, but necropsy revealed meningitis from catarrhal otitis. The course of the meningitis had been so fulminating that the death had been ascribed to suicide. In the three fatal cases in Eiras' practice, two of the patients had changed doctors because he had insisted on an operation, and the third consented to intervention only when practically moribund. Two of the six successful operative cases were in infants of four and eleven months. In one young adult the meningitis was consecutive to gonococcemic otitis, mastoiditis, and arthritis of the temporomaxillary articulation, and the operative measures were supplemented with vaccine therapy according to Wright's method. A cure was realized without operation in five cases, draining the suppurating otitis media and rinsing with hydrogen dioxid once or twice a day; these were all children but one. The otitis had developed during convalescence from influenza in three of them. Even a simple

catarrhal otitis is liable to set up meningitis. There had been no pus in the discharge from the ear in one of his cases, but the operation disclosed a large collection of pus. This frequent finding sustains the theory that otitis media is not always due to invasion from the nasopharynx but may be a local explosion from a general infection. This mechanism was evident in his gonococcemia case; there was no suppuration in the middle ear, but it contained the gonococcus. The mastoid antrum should be opened up at the slightest suspicion of involvement of the brain. We must remember, he says, that the most treacherous cases may show very few symptoms, and that an exploratory operation here is the most harmless of all surgical ventures. During the 1917 epidemic of acute otitis media he often encountered two or three or even six cases in one home.

Morquio, L. ACUTE MENINGITIS. [Archivos Latino-Amer. de Pediatria, January-February, 1920.]

The author, in discussing his clinical experience, remarks upon seeing twelve cases of tuberculous meningitis in children within two weeks. Furthermore he had observed two of pneumococcus meningitis and four of meningococcus meningitis, and influenza was responsible for two. In another an otitis was the starting point, and one with clear spinal fluid during life but necropsy revealed pus, a total of twenty-two cases in two weeks. The prognosis is losing its extreme gravity in other than tuberculous forms, he says, if serotherapy be employed. Pneumococcus meningitis has a stormy onset. One young boy died in twelve hours. Cases in which everything seemed to indicate primary tuberculous meningitis were not infrequent, but progressive improvement and recovery ruled this diagnosis out. Mumps meningitis often presents this complication. Poliomyelitis meningitis was usually mild. Syphilitic meningitis assumes a chronic form with or without functional reactions. Inherited syphilis must always be sought for, since in the graver cases he has always found tuberculous meningitis superposed.

Caussade et Rémy. THE HYDROCEPHALIC FORM OF CEREBROSPINAL MENINGITIS IN INFANTS. [Paris méd., February 12, 1921.]

Failure of specific treatment in cerebrospinal meningitis is here held to be due to a complicating infection within the ventricles. It occurs more often in infants, in whom it is characterized by definite signs and symptoms, but also occurs in the adult, where its signs are less obvious, and furthermore, more amenable to therapy. A characteristic symptom of the hydrocephalic form of cerebrospinal meningitis in infants is a long latent stage, gastric derangement and respiratory catarrh often being confusing prodromata. The hydrocephalus, owing to the hardness of the skull in the adult, in the infant is shown by increase in size, widening of the fontanelles, separation of the sutures, craniotabes, lowering of the eyeballs, and development of a well-marked venous circulation on the scalp. The anterior fontanelle shows permanent tension and does not sink down,

even when cerebrospinal fluid is withdrawn by lumbar puncture. Pulsation ceases. No benefit can be derived from lumbar puncture or upper vertebral puncture; the only method of any avail is puncture of the ventricles, these observers state. The quantity of fluid to be withdrawn varies, the more turbid the greater the amount which should be removed. Serum to be injected should equal the amount of cerebrospinal fluid removed. The injections should be made alternately into each ventricle every second day. Cerebrospinal lavage with antimeningococcal serum is another advantageous procedure. For this purpose lumbar puncture is performed at the same time as ventricular puncture, and the serum is injected slowly into the lateral ventricles until it escapes by the needle used in the lumbar puncture.

Edelmann, A. BABINSKI PHENOMENA IN MENINGITIS AND BRAIN EDEMA. [Wien. klin. Woch., November 25, 1920.]

If observing the following procedure: the leg, completely extended, is flexed at the hip joint, a dorsal extension of the big toe occurs in the presence of meningitis, in a manner similar to that in the Babinski phenomenon. An early symptom of meningitis in children, it appears also in senile meningitis in which neck rigidity and the Kernig sign are absent not infrequently. Not only with meningitis but also with brain edema is this symptomatic reflex frequently seen.

Tronconi. SHOULDER PHENOMENON IN TUBERCULOUS MENINGITIS. [La Pediatria, September, 1921.]

A symptom first described by Binda and believed by him to be almost pathognomonic of tuberculous meningitis, is here tested out by this observer. In a large number of healthy children it was absent, but was present in seven autopsically proved cases of tuberculous meningitis. The sign consists in a sudden raising and forward projection of the shoulder, following a rapid passive rotation of the head to the opposite side. Light hand pressure on the head should be used until a certain muscular relaxation is induced, and then the head should be turned rapidly to one side. In view of the extreme difficulty of diagnosing tuberculous meningitis in children, especially in its early stages, every likely clinical test should be carefully followed up.

Dumont and Cotoni. BACILLUS MURISEPTICUS A CAUSE OF MENINGITIS. [Ann. Institut Pasteur, October, 1921.]

This case of an Italian soldier presented on admission the typical picture of an acute case of meningitis. There was no history of cranial injury or of ear trouble. Twenty c.c. of turbid fluid under pressure was obtained by lumbar puncture. On examination this was found to contain a number of red and white cells—40 per cent of lymphocytes and mononuclears and 60 per cent of polymorphs. No reduction of Fehling's solution occurred. A thin rectilinear, Gram-positive bacillus with square ends

were seen in microscope. Forty c.c. of antimeningococcal serum were administered, but without effect. A second injection was of no service, and the patient died in two days' time. From the cerebrospinal fluid a pure culture of the bacillus was obtained and found to be one of a group of organisms associated with swine erysipelas, usually known as *B. murisepticus*. Several cases of general infection with this organism have been reported. This is apparently its first finding in meningitis.

Bender, W. MENINGITIS DUE TO INFLUENZA BACILLI. [Centralbl. f. Bakteriologie. (&c.), Abt. 1, 1921, Orig., LXXXVII, 175; Med. Sc.]

The author describes two cases of genuine influenzal meningitis and refers to thirty-five others in the literature. Reference is also made to the confusion of *B. influenzae* Pfeiffer and the bacillus found by Cohen (Ann. de l'Inst. Pasteur, 1909, XXIII, 273). This organism is also hemoglobinophilic, but can be differentiated from *B. influenzae* by the fact that in small doses it produces a typical septicemia in rabbits and guinea pigs. True influenzal meningitis is almost exclusively a disease of children under two years and begins with gastro-intestinal or nervous symptoms. The mortality in children is about 91 per cent; in older persons about 44 per cent. Anatomically the meningitis occurs on the convexity as well as the basis and passes to the cord. In many cases the infection is a metastatic process from a primary focus in the lung, although a primary invasion from the nasopharynx or from an otitis media is also known.

Fleischmann, O. CEREBROSPINAL FLUID AND THE CHOROID PLEXUS. [Zschr. f. d. ges. Neur., Vol. LIX, 305.]

Fleischmann rejects both of the more recent opinions as to the source of the cerebrospinal fluid, that it is a secretion of the choroid plexus or that it is a dialyzate of the blood plasma. Basing his conclusion upon the results of vital staining, he explains the origin as the result of a filtration process from the blood vessels in which, through specific activity of the plexus cells, all the constituents of the serum, the conversion of which is doubtful, are seized and absorbed, a process which he briefly designates as "absorptive secretion." He believes that the aqueous humor, labyrinthine endolymph, and the liquor amnii are the result of similar processes.

Wrigley, F. G. CAVERNOUS SINUS THROMBOSIS. [Jl. Laryn. & Otol., August, 1921.]

This is a clinical report of an operation performed for a supposed lateral sinus thrombosis. The operation resulted in a free flow of blood on opening the sinus, but before it was controlled a clot about 18 mm. in length was expelled. This clot was found to be undergoing disintegration. Pain, proptosis, and edema of the lower lid disappeared after ten days, and the author argues that the condition had been one of

cavernous sinus thrombosis and that the clot had been sucked through one of the petrosal sinuses by back pressure at the time of operation. Had the bleeding been more easily controlled, the clot would not have been expelled and a fatal result would have been probable.

Kopetzky. SEPTIC SINUS THROMBOSIS. [Laryngoscope, December, 1920, XXX, No. 12.]

A clinical report of six cases of this condition occurring in children. The painless type of mastoiditis is the source of the greatest danger. A more general knowledge of the various types of mastoiditis, by specialist as well as general practitioner, is desirable if this complication is to be avoided, as not all types can be treated in the same manner. Some present graver risks to the patient than others. A hemorrhagic lesion, accompanying or following an attack of influenza, and giving septic symptoms, makes a study of the sinus condition imperative.

Foix. SYNDROME OF THE CAVERNOUS SINUS. [Bul. d. l. Soc. Méd. des. Hôp., November 12, 1920, XLIV, No. 34.]

This clinical study calls attention to certain signs of a rapidly progressing unilateral ophthalmoplegia accompanied with pain in the region of the ophthalmic nerve, and is one of the early signs of involvement of the cavernous sinus, which is not negatived by the absence of disturbance in the circulation and negative roentgenoscopy. In one clinical case reported necropsy revealed a sarcoma located in the posterior lobe of the pituitary. Here was a bilateral external rectus and later involvement of the third and fourth nerves. A similar clinical history was present in a second case in which a tumor was removed as it lay on the posterior wall of the sphenoidal sinus. The author speaks of the advisability of intervention with access through the nose in such cases. A sphenoidal lesion may be cured and a tumor beyond removed.

Crawford, W. B. FRACTURE OF BASE. [New Orleans Med. & Surg. J., LXXIV, 1921, No. 5.]

This clinical paper advocates spinal tappings in the treatment of fractures of the base, though it is not claimed that it is the ideal method of treatment in all cases. Crawford contends that the treatment is well within the reach of all of us, and that if done repeatedly and enough fluid is withdrawn, the intracranial pressure will be relieved and much good will follow. It is really a spinal decompression and drainage, and where there is no blockage at the foramen magnum, the spinal pressure will be relieved and subsequently the intracranial pressure, too. He makes it a rule to do a spinal puncture in all head injuries, whether a fracture is suspected or not; it will do good in concussions, contusions, or basal fractures. In no one of his ten cases did he puncture less than three times, and in three severe cases he punctured six times. All of his cases recovered. He quotes W. Sharpe, who claims that the majority of basal

fractures, in fact, two-thirds of all cases, do not have an increase of intracranial pressure of more than 12-14 mm., as registered by the spinal mercurial manometer, and as long as this is true spinal punctures will suffice and that decompression operation is unnecessary. If the pressure is over 16 mm., a decompression should be done immediately.

Neuhof, H. TREATMENT OF CRANIO-CEREBRAL WOUNDS. [Annals of Surgery, November, 1920.]

The wider use of local anesthesia in dealing with cranio-cerebral wounds is here advocated. Cranial injuries with extrusion of the brain substance are not common in civil life, but they were extensively observed during the World War. It is in civil cases with soiled scalp wounds that the indications for treatment most closely resemble those of gunshot wounds. The piecemeal removal of bone fragments and spicules from the brain, followed by drainage, has never been satisfactory. Perforation of the brain by the relatively low explosive bullets of civil life, however, must not be placed in the same category as injury to the brain from war projectiles, for in the former case relatively little foreign matter is swept in and the indications for *débridement* do not exist. The more logical treatment of the late complications of hernia cerebri and epilepsy must follow the extensive war experience and the indications for extraction of intracerebral projectiles have been more clearly defined.

Bailey. CRANIAL AND INTRACRANIAL BIRTH INJURIES. [Amer. Jour. of Obstet. & Gynec., October, 1920; Aust. M. J.]

About 30 per cent of still births and early deaths are due to injury to the head of the infant during labor. Many of these fatalities the author believes could be avoided. Kerr in 1901 recommended treating spoon-shaped depressed fractures by pressure of the head in the long axis, but the danger from this is intracranial pressure and hemorrhage. Cushing in 1905 advocated parietal decompression by a large osteoplastic flap; two treated thus recovered and two died. Tweedy (1908) advised that the surgeon make an incision and bore a hook of a volsellum through the depressed bone and raise it. Intracranial hemorrhage may occur in vertex or breech presentations. It may be due to rupture of cortical vessels from asphyxia, from excessive molding of the bones with tearing of the meningeal and arachnoid veins or from pressure and traction with forceps. Of 100 cases in the Manhattan Clinic, 40 had cerebral hemorrhage. Only 10 were not still born. One lived twenty minutes, one thirty minutes, one three hours, and the others fourteen hours to four days. The hemorrhage in 18 cases was diffuse over the cerebrum, 11 were specially marked under one bone, 2 were diffuse and in the ventricles, 2 in the ventricles alone, 1 was a diffuse meningeal hemorrhage with thrombosis in the sinus, 2 were in the cerebellum, 2 in the pia, and 2 in the dura. He concludes that the decompression operation with large flap does not give good results. Cushing had only four successes in nine

cases. The Tweedy procedure is open to the objection that there may be fracture and meningeal hemorrhage under the depression, as occurred in one case. This cannot be detected unless a button of bone is raised at the same time. In the case of stillborn children with a strongly beating heart, where respiration cannot be started, further investigation is required. All our present methods of artificial respiration increase intracranial pressure. For these mechanical respiratory apparatus which will inject air and withdraw CO_2 seem the best.

4. BRAIN, TUMOR ABSCESS, HEMORRHAGE.

Borries, G. V. T. OTOGENOUS ENCEPHALITIS. [Hospitalstid., August, 1921, LXIV, No. 35.]

A rare situation such as acute uncomplicated encephalitis without abscess is here discussed. Five cases, two in his own experience, are analyzed. Brain abscess symptoms with negative local findings is the syndrome, which has a good prognosis. Treatment is expectant. His two cases show how an apparently hopeless case of brain abscess can turn out to be a spontaneously curable encephalitis of this kind. If pus is not found on puncture of the brain the case need not be regarded as of bad prognosis.

Lefort. BRAIN ABSCESS FOLLOWING WOUNDS. [Thèse de Paris, 1920.]

Lefort deals with abscess of the brain following wounds. He states that abscess occurs in 3.11 per cent of cranial injuries generally, in 24 per cent of infected wounds of the head. Only the superficial abscesses are easily diagnosed; deep abscesses may remain latent for several months and end by opening into the lateral ventricle. Foreign bodies are the usual exciting causes, often giving a positive culture after months of sojourn in the brain. The chief symptoms of the development of an abscess are headache, vomiting, slowing of the pulse, epileptiform crises. The bacteriology of the pus found is important in prognosis, staphylococcus being favorable, streptococcus much more serious. Lefort believes in the importance of autovaccination, which appears to have reduced the mortality in Villandre's clinic from 50 to 25 per cent. [J.]

Cushing, Harvey. CHOLESTEATOMA OF THE PARIETOTEMPORAL REGION. [Surg. Gynec. & Obst., 1922, XXXIV, 557-66; Med. Sc.]

These tumors, though fairly common in the temporal region, usually excite considerable comment when discovered post-mortem in other parts of cranium. They have never been diagnosed before operation or autopsy. They were first spoken of by Cruveilhier as "tumeur perlee." They were given their present name in 1838 by Johannes Mueller. The term has been used since to describe any tumor which contains cholesterol crystals, whether of endothelial or epithelial origin. Those of epithelial origin are found to be less than 1 per cent of intracranial neoplasms. In

the author's 740 cases of tumors there were only three examples of cholesteatoma. In two cases hair was present in the tumor, so they may arise by epidermal or dermal implantation. The most common situations are (1) in and about the temporal bones, (2) free in the leptomeninges of the cerebral base, (3) the cerebral ventricles, these last being endothelial tumors. They also occur between the two tables of the skull, their glistening surface obscured by their environment. As they grow the inner table becomes ballooned out and absorbed more than the outer. In the cases described there were few signs—a slight dragging of the left foot, weakness of the left hand, homolateral signs difficult to explain, with very definite X-ray signs over the left hemisphere. This consisted in a quadrilateral area of absorption of bone about 3–5 inches on each side, the outline sharply demarcated; at one point there was complete absorption which corresponded to a tender and pulsating spot in the skull. An osteoplastic flap operation was performed, the margins of the flap being outside the absorbed bone. The tumor was stripped away from the bone, leaving a large depression in the hemisphere. The tumor weighed 175 gm. and measured four inches in diameter. Six historical cases are quoted of this diploic type of cholesteatoma where operations had been performed by opening into the tumor, through the absorbed bone making the proper eradication of the tumor extremely difficult, as the important thing is completely to remove the epidermal membrane if recurrence is not to take place, and this is well-nigh impossible if the cyst has collapsed.

Suné y Medán, L. FRONTAL SINUSITIS WITH ORBITAL ABSCESS.
[Revista Española de Medicina y Cirugía, July, 1921, IV, No. 37.]

A twelve-year-old had abscesses in the upper eyelid, due to necrosis of bone of the wall of the orbit, requiring three operations. The frontal sinus was then curetted and swabbed with iodine, and the head of the middle turbinate was resected. The sinus was also cauterized with chromic acid and silver nitrate before the necrosis ceased, which was two months later.

Hermann, Georg. SYMPTOMATOLOGY OF LEFT TEMPORAL LOBE TUMORS.
[Zeitschr. f. d. ges. Neur. und Psych., Vol. LXXVI, Nos. 1, 2.]

The author reports certain symptoms as typical of tumors located in the deepest portions of the left temporal lobe. There is difficulty in finding words, appearance of paraphasia, finally disturbance of comprehension of words. Two cases observed reveal this succession of symptoms as well as the more general symptoms of tumors. [J.]

Cushing. DISTORTION OF VISUAL FIELDS IN TEMPORAL LOBE TUMORS.
[Brain, January, 1922, XLIV, No. 4; J. A. M. A.]

In Cushing's experience the temporal lobe is a common seat of cerebral tumor (59 cases in a series of 276 verified supratentorial tumors). In 59 verified temporal lobe tumors, perimetry, owing to the advanced stage

of the process, was precluded in 20 cases, but of the remaining 39 homonymous field defects, indicating involvement of the temporal loop of the optic radiation, were present in 33 instances. Heretofore the most important symptom for temporal lobe localization has been the occurrence of the so-called uncinate fits, but in this series, even including as such all attacks of petit mal without gustatory impression, they have been recorded in 24 cases only. Visual hallucinations have been a frequent symptom of the temporal tumors in this series (13 out of the 59 cases). Auditory phenomena in this series are conspicuous by their absence. In a few cases only has there been tinnitus and rarely some lowering of sound perception. The chief errors of diagnosis arise (1) when, with a total median hemianopsia, the occipital lobe is considered to be the tumor seat; (2) in the absence of demonstrable field defects, when symptoms supposedly of cerebellar origin are to the fore. Hence, it is fair to conclude that perimetry gives information of paramount diagnostic value, particularly in the early recognition of temporal lobe tumors, the partial field defects short of a hemianopsia being especially characteristic of involvement of the optic radiation in this region.

Bastiaanse, F. S. van Bouwdijk. A FAMILIAL FORM OF TUBEROSE SCLEROSIS. [*Nederland. Tijdschr. voor Geneeskunde*, February 18, 1922, LXVI, p. 718.]

Patient, No. 7 out of a family of nine, was shown by Bastiaanse. He is a troublesome boy, with nocturnal enuresis, and looks ill. No evidence of congenital lues; negative Wassermann. Formerly learnt well, but for a year badly. He comes for "absences"; luminal controlled these. Right nasolabial fold gone, tongue comes out to right. Retinal vessels engorged and tortuous; discs gray, badly defined borders; early optic neuritis, greater on right. The definite "shagreen skin" of Schuster is present. Cutaneous plaques, of the size of a rix-dollar, better felt than seen; two of these are on the sites given by Schuster as characteristic, viz., one at level of twelfth rib, the other at pelvic crest. Patient's father and all his family are drinkers; father died from an operation on gastric myosarcoma that was perforated by a deep ulcer (possibly this was part of a tuberose sclerosis). In the mother's family there is pulmonary tuberculosis, alcoholic abuse, and lues. Of the nine children No. 1 died after a status epilepticus from tuberose sclerosis (macroscopically and microscopically confirmed); he was of normal intelligence, had had three attacks earlier, had no cutaneous lesions, and kidneys and heart were normal. No. 2, boy, healthy, only an occasional attack after alcohol misuse. No. 3, girl, healthy. No. 4, girl, has tuberculosis, epilepsy, typical "shagreen skin," facial paresis, small tumors in retina, *i.e.*, tuberose sclerosis. No. 5, girl, died with tumor of ventricle of heart, tuberose sclerosis, pulmonary tuberculosis. No. 6, girl, being treated for pulmonary tuberculosis. No. 7, the boy with tuberose sclerosis shown by Bastiaanse. No. 8, boy, healthy. No. 9, boy, died from tuberose sclerosis.

Apparently only one case of familial tuberose sclerosis has been described (by Bey). The disease is quite distinct from the neurofibromatosis of Recklinghausen; Bastiaanse's cases have no tumors of nerve trunks, and the six recorded cases of neurofibromatosis with brain foci are quite different from tuberose sclerosis. [Leonard J. Kidd, London, England.]

Clark, L. P. CORTICAL POLIOMYELITIS AND EPILEPTIC ATTACKS. [N. Y. Med. Journ., February 1, 1922, CXV, No. 3.]

Clark here calls attention to a situation first emphasized in Medin's classical contribution, that of cortical involvement in poliomyelitis with epileptiform attacks. Two of the patients were bright, sensitive, over-active boys, interested in sports and games, engaging in them according to their own desires. They showed a mild type of epileptic make-up and he thinks the inception and continuance of the epilepsy was conditioned upon this make-up. A third patient was a classical epileptic. Just what the meningeal or cortical lesion coincident with the poliomyelitis may have been cannot be surmised. Clark states he has seen only three such cases in many thousands, figures at considerable variance to the autopsy records.

Mallory, F. B. THE TYPE CELL OF THE SO-CALLED DURAL ENDOTHELIOMA. [J. Med. Research, 1920, XLI, 349.]

The generally adopted classification of tumors according to the type cell from which they arise has not been applied to dural endothelioma, with the result that its relation to other forms of tumor, and the range of variations in the cellular character of the tumor, have not been elucidated. The current view is that this tumor arises from the endothelial cells lining the inner surface of the dura (the subdural space). Mallory has carried out an examination of thirty endotheliomata. In one type (cellular type) the predominating cells are large and flattened; in the second (fibrous type) they are spindle-shaped. In both there is a marked tendency to the formation of whorls, and the stroma is scanty. The cells are surrounded by delicate fibroglia fibrils and by collagen and elastic fibers in varying degree. Where the growth invades the dura, the cells of the latter are stimulated to growth and form a coarse stroma for the cells. In the whorls the larger of the spindle-shaped cells may predominate, or there may be concentric layers of intercellular substance round a central point. Fibrous whorls are most common and arise from the inclusion of fibroblasts in cellular whorls. The arachnoid differentiates early in embryonic life from the mesenchyma surrounding the brain and cord, and it separates the pia from the dura. The clefts which form as it separates from the pia later become the cisternae of the subarachnoid space, which is lined by fibroblasts alone. Where it separates from the dura, the inner surface of this is also lined by fibroblasts and there is no dural endothelium. The cleft is the subdural space. As the arachnoid develops, its fibroblasts acquire histological characteristics

peculiar to it. On its external surface patches of endothelial cells form and cause local thickenings of the membrane. With advancing age these surface cells multiply in foci and form cellular buds which may show a whorl formation. There may be dural fibroblasts in these buds, and then fibrous whorls with numerous elastic fibrils are produced. When the cells in the buds differentiate fibroglia, collagen and elastic fibrils are formed, and in this way the arachnoid becomes thickened. The buds of proliferating arachnoid cells show from their earliest stage a marked tendency to invade the dura, pressing its fibrous strands apart. When the cells secrete intercellular substance the arachnoid villi and Pacchionian bodies are produced. If the invading cells take on a malignant character, a so-called dural endothelioma results. The stroma and blood vessels of this are provided by the fibroblasts of the invaded dura. The growth should, therefore, be regarded as an arachnoid fibroblastoma. The tumor may be of rapid or of slow growth, and may or may not contain whorl formations. When slow growing the cells differentiate and produce fibroglial collagen and elastic fibrils. Such a tumor can invade the dura and tissues external to this, but it never invades the arachnoid membrane from which it has arisen. The perineurium is probably analogous in origin with the arachnoid, but is not an outgrowth from this. It has no undifferentiated outer layer of proliferating cells, nor is it separated from endo- or epineurium by clefts. It is most highly developed in the stratified sheath of the Pacinian corpuscle. Tumors frequently arise from it (neurofibroma, fibroma molluscum). They have certain histological features differentiating them from arachnoid fibroblastomata, and they differ also in their tendency to invade nervous tissues, as in plexiform neurofibroma. Mallory terms these tumors perineural fibroblastoma. The ordinary auditory nerve tumor belongs to this group. Nerve fibers and neuroglia fibrils are sometimes found in an auditory tumor because the tumor invades the nerve in which both are normally found. In connection with this important paper the reader is referred to Cushing's observations on the arachnoid villi (Med. Science).

Cassirer, R., and Lewy, F. H. TWO CASES OF SUPERFICIAL BRAIN TUMOR. [*Ztschr. f. d. ges. Neurol. u. Psychiat.*, 1920, LI, 119; Med. Sc.]

This paper is a contribution to the subject of "pseudotumor," a condition in which the clinical picture is that of cerebral tumor, but in which recovery occurs, or, in the event of death, no tumor is discovered. The authors consider that Reichardt's theories and Alzheimer's discovery of ameboid glia cells fall short of a full explanation of the condition. They report two cases of apparent "pseudotumor" and discuss their bearing on the problem. The first was that of a middle-aged woman with left abducens paralysis, severe optic neuritis more marked on the left side, a tendency to fall to the left, and tenderness of the skull over the posterior fossa of the skull. Decompression did not relieve the symptoms and at

autopsy an apparent encephalitis in the region of the left angular gyrus was found. Microscopical examination revealed a diffuse sarcomatosis of the vessels entering the cortex of the left angular gyrus, and the left inferior surface of the cerebellum. There were also numerous ameboid glia cells and an increase of glia fibrils under the ependyma of the left lateral ventricle in the neighborhood of the corpus callosum. The second case was that of a man of thirty who had headache, vomiting, optic neuritis, and also attacks of loss of consciousness attended with stertorous breathing and slowing of the pulse. There were various cranial nerve palsies, tendon areflexia, and blindness ensued within a few months of the onset of symptoms. Autopsy revealed no naked-eye tumor, but microscopically the pia over frontal and parietal lobes was infiltrated with typical round cells of sarcomatous nature. In both cases there were numerous minute growths, which appeared to have arisen in the adventitial lymph spaces. Blockage of these they regard as causing edema of the brain and glia cell proliferation. Lumbar puncture was not performed in either case. Rindfleisch's meningitis sarcomatosa is comparable with this condition. They conclude that lumbar puncture might well have a great diagnostic value in cases of "pseudotumor," on account of the possible cellular content of the fluid in cases such as those now reported. They consider that "pseudotumor" should never be diagnosed without careful microscopical examination of the brain.

Neel, A. V. BRAIN CYST. [Ugeskript for Laeger, April 8, 1920, LXXXII, No. 15.]

Coincident with a severe fright, this patient, a woman of seventy-six previously well, had severe choreic movements. At first thought of as psychogenic, its advancing and progressive character, accompanied by a mental deterioration, led to a revision of diagnosis, and on autopsy a subdural cyst was found beneath a frontal bone fracture which had resulted from a fall some time previously.

Anglade. OCCIPITAL TUMOR SIMULATING GENERAL PARALYSIS. [Journ. de Méd. de Bordeaux, 1921, XCII, No. 16, p. 484 (1 fig.).]

Anglade reports the case of a woman, forty-five, who was admitted in an apparently advanced stage of general paralysis. She showed an absurd euphoria, alternating with ideas of negation of her organs, and mental decay. She had total internal ophthalmoplegia, very marked dysarthria, and massive albuminosis and confluent lymphocytosis of the cerebrospinal fluid. She had suffered from extremely violent occipital and vertical headaches, accompanied by a burning sensation, throbbing inside the skull, mist before the eyes, tinnitus, and vertigo. The pains were worse by day, in spite of poor sleep at night. In three weeks' time she died suddenly. Necropsy showed evidence of a chronic purulent meningitis and a tumor (extracerebral) in the right occipital region, with softening in its neighborhood. The tumor was proved to be an angi-

olithic fibrosarcoma. The area of the pains corresponded rather closely with the site of the tumor. Evidently the tumor had compressed the brain long before the meningo-encephalitis occurred. [Leonard J. Kidd, London, England.]

Barkman, A. BRAIN SARCOMA SUCCESSFULLY REMOVED. [Acta Medica Scandinavica, August, 1921, LV, No. 4.]

This patient showed jacksonian attacks for five years. She then had a paralysis of the left arm, with disturbances in the muscles of the abdomen, bladder, and optic neuritis. A brain tumor was removed, after which the muscles in the hand on the paralyzed side atrophied. The tumor was a sarcoma in the region of the posterior central convolution of the right frontal lobe. The paresis gradually passed away and for eleven months the patient felt well. She developed a chill and other symptoms indicating an abscess in the brain.

Clark, W. A. SARCOMA OF BRAIN SIMULATING LETHARGIC ENCEPHALITIS. [Missouri State Medical Ass'n Journal, September, 1921, XVIII, No. 9; J. A. M. A.]

Headache and drowsiness were the first symptoms in Clark's case. This was followed by general weakness, listlessness, and inarticulate speech. The patient was in a semistuporous condition, with tendency to fall asleep when not talking, but could be easily aroused and answered questions intelligently. His face had a peculiar masklike expression and gave the impression of some involvement about the seventh nerve. The tongue was coated with a peculiar sticky, whitish material, and the breath was so bad that nothing could describe it except "rotten." The pupils were normal, as were also all reflexes. Spinal fluid Wassermann reaction was negative. After a few days he made no effort to pronounce words right and would reply to questions in a very indistinct whisper. This whispering voice and frequent movement of the lips without a whisper persisted for the next two weeks, though only when he was aroused by questions asked in a loud tone of voice. He took some nourishment but seemed to have no desire for food. For ten days he slept practically all the time, only rousing up about 4 A.M., and became partially awake, at which times he seemed restless and gave evidence of some pain in the head. Hiccup was very troublesome during the entire sickness and almost invariably arose when anything entered the stomach, even water. Death occurred six weeks after the onset of these symptoms. At the necropsy the chief lesion was a tumor, for the most part fairly circumscribed, located in the lateral ventricle of the left cerebrum. The tumor filled the pars centralis of the ventricle, and swinging around the thalamus occupied a portion of the anterior and inferior cornua, but did not reach into the posterior cornu. In addition to the tumor mass, there was a large, irregular lesion of colliquative necrosis, located in the posterior half of the cerebrum, and embracing in depth approximately its middle

third. This lesion, the most of which washed out when the cerebrum was opened, extended posteriorly into the lateral inferior portion of the occipital lobe, and reached anteriorly to the posterior margin of the lentiform nucleus and the cortex of the posterior insula. Sections from both the more circumscribed tumor and the edges of the necrotic lesion showed a mixed cell sarcoma, mainly of the large spindle cell type. The edges of the necrosed part particularly were complicated by the presence of a definite inflammatory reaction. The histologic complex was characteristic of certain forms of the infectious granuloma. Even under ordinary stains, a filamentous type of organism was visible, and by the positive Gram stain it appeared in characteristic thread-like and branching form, with frequent clubbed ends, both thickly scattered and in focal clumps. The minute yellow foci of macroscopic description could be identified with these clumps. From the gross yellow points, the anaerobic conditions of growth, and the greater thickness of the filaments (at least three micra, and visible under low power), the probabilities all appeared to be in favor of an actinomycetes rather than a nocardia infection.

Baehr, E. M. TUMORS OF CORPUS CALLOSUM. [Ohio St. Med. Journal, September, 1921, XVII, No. 9.]

This unusual case was more or less readily surmised as a brain tumor of a noninfiltrating or expansible type. Following Bristowe's general principles, he made a diagnosis of callosum involvement. His general formula for identification contains the following ideas: Disorder of intelligence; absence or insignificance of signs of increased intracranial pressure; absence of definite evidence of tumor of the frontal lobe, and absence of paralytic or convulsive phenomena, until by encroachment motor and sensory pathways or cranial nerves are affected.

Mathewson, T. H. R. INTRACRANIAL TUMOR. [Med. Journ. of Australia, November 5, 1921, II, No. 19.]

In this clinical pathological report of a brain tumor the brain was found resting on a large, thin-walled cyst; 120 c.c. of straw-colored fluid were obtained from this cyst. The wall of the cyst was continuous with the soft tissue of a new growth hanging down into the interpeduncular space and apparently replacing the infundibulum and tuber cinereum.

Lotmar, F. WASSERMANN REACTION WITH BRAIN TUMORS. [Schweiz. med. Woch., November 3, 1921, LI, No. 44.]

In a series of brain tumors in which a series of serological tests were carried out, this observer found a few with positive Wassermann reactions in the C.S.F. They were nonsyphilitic. In one case, a man of forty-three, the test was negative with the blood but strongly positive in the C.S.F. Arsphenamin treatment caused increase of symptoms. The tumor was partially removed and found to be a large xanthofibrosarcoma in the cerebellopontine angle.

Broca, A. BRAIN TUMORS IN CHILDREN. [Progrés Medical, July, 1921, XXXVI, No. 30; J. A. M. A.]

Broca recently reëxamined a girl whom he had treated by a decompressive operation nine years before. In this, and in two other cases he describes, the symptoms indicating pressure on the brain were pronounced. Choked disc is the effect of pressure, and it can retrogress without entailing atrophy of the optic nerve if the pressure is relieved in time. As long as the skull is elastic the pressure from a brain tumor is seldom so great as in older children and adults. The pressure may spread the sutures; in this case temporary relief follows. In one such case the vomiting and headache lasted only a month although the diagnosis of a brain tumor was beyond question. In his case with an interval of nine years since the palliative operation, the girl, now twenty, is still blind, and the mental condition has deteriorated, but she does not suffer and has a good appetite. The large decompressive operation followed seven months after the first symptoms of the brain tumor, but there were no focal signs. In such cases, when it is impossible to locate the tumor, all we can do is to watch for the first indications of choked disc, and operate at once to ward off blindness from the intracranial pressure.

Constantini. SYNDROME OF TEMPORAL LOBE TUMORS. [Il. Policlinico, November 11, 1921.]

The many symptoms presented by tumors in this locality give special interest to the syndrome. Epileptoid crises are especially common in these cases, and according to Mingazzini psychic symptoms of some sort are practically never absent. Two case histories are given in this contribution by Constantini. In the first the initial symptoms were a depressive state, followed after several months by disorientation, motor disquietude, mutism, lachrymose state, sitiophobia, inability to comprehend questions and orders, and among nonpsychic symptoms, headache and marked vertigo. The tumor was found in the posterior part of the left temporal lobe. The other patient presented great motor restlessness, coprolalia, ideas of persecution, disorientation, suicidal tendencies, transcortical sensory aphasia, in the beginning. Later there were depression, mutism, refusal of food, insomnia, etc. In this case the seat of the neoplasm was the median-posterior portion of the fusiform lobe and third temporal convolution, with some involvement of the second and first.

In cases with epileptoid seizures there have also been noted post-convulsive confusional states with hallucinations having a religious coloring, oniric delirium, and visual hallucinations under the form of an aura. Hallucinations of the other special senses are even more common. In some cases euphoria is present, as in frontal tumors; in others bulimia or alteration of character. As to the rationale of these symptoms the greatest divergency is seen. A number of psychiatrists look on the temporal lobe as the seat of definite psychic functions. But the great number and variety of psychic symptoms make this physiological explana-

tion confusing and unsatisfactory. The termination of these cases in apoplectic ictus is also paradoxical, although of course there are minute hemorrhages in the neoplastic tissue.

In tumors of the left side the psychic symptoms may be brought in association with the sensorial aphasia so often present. Knapp mentions paraphasia in this connection as having marked diagnostic significance, and Oppenheim particularizes amnesic aphasia as a symptom of left-sided temporal tumors. But aphasia of any type is often absent. Mingazzini, in the interest of diagnosis purely, makes four regions each with its clinical picture. These are the anterior half or two-thirds of the convex aspect of the temporal lobe, the posterior half or third, the inferioposterior aspect, comprising the lingual lobe and posterior half of the fusiform lobe, and the region of the hippocampus and anterior extremity of the fusiform lobe. Leading symptoms of tumor in the first region are defective motility, and on the left side speech disorders; in the second region hemiparesis of the opposite side, including some ocular pareses; in the third region general symptoms are chiefly absent and the focal symptoms are pareses of some of the ocular muscles or the facialis, hemiparesis, and hemianesthesia. In the fourth region there are hallucinations of smell and taste. This special symptomatology for regions is not only meager in the extreme but often overlaps. Since the neoplasms are usually not limited to these arbitrary regions, the totality of the clinical picture varies indefinitely. To have value the locality of the point of origin should be determinable, for after the progress of the tumor the number of symptoms, as already seen, is rapidly increased.

Thouvenet, A., and de Lamothe, G. D. AN OTOGENIC TEMPORAL LOBE ABSCESS WITH ACUTE MENINGOCOCCAL MENINGITIS CURED BY FREE OPENING COMBINED WITH INTENSIVE SEROTHERAPY. [Rev. de Laryngol., d'Otol., e. d. Rhinol., March 31, 1922, XLIII, p. 242.]

A man of twenty-eight had acute meningococcal meningitis. When he was almost moribund, a large temporal lobe abscess, of the size of a tangerine orange, was evacuated. Lumbar puncture showed meningococci; he was at once, therefore, treated by massive injections of anti-meningococcic serum. In a few months' time he recovered completely. The patient would certainly have died very quickly if the meningococcus had not been found in the cerebrospinal fluid and if anti-meningococcal serum had not been used at once together with free evacuation of the temporal lobe abscess. [Leonard J. Kidd, London, England.]

van Genderen, W. J. van den Hoven. A CASE OF ENCEPHALOCELE POSTERIOR. [Academisch Proefschrift, 1920, Utrecht, Drukkerij Zuidam.]

In this thesis van den Hoven van Genderen describes a case of encephalocele posterior with the microscopical findings on necropsy. Patient was an infant of two days, who died five days later. There was a bluish, chestnut-sized tumor on the occiput at about the small fontanelle region;

on its lower surface there was a cleft-shaped opening from which a light red fluid escaped continuously; the fluid contained albumen, red-blood cells, and a great number of polynuclear leucocytes, and gave a positive Nonne reaction. Neck very short, back bent, arms flexed, hands, especially left, strongly flexed and pronated, and hips and knees flexed. When the tumor was raised the child yelled. Temperature subnormal (once down to 33.2° C.). No taste-reactions, no defensive movements of face, no pupil reaction; corneal reflexes present. Tonic labyrinthine reflexes absent. Strong vestibular reactions present. The otolith reflexes almost or entirely absent. A weak Faradic current applied over right side of the sac gave clonic contractions in left upper arm, but over left gave no response. X-ray photos show the parietal bones to be very small or possibly absent. The writer gives the following conclusions: (1) The termination period for the occurrence of an encephalocele is at the fourth or fifth week of fetal life. (2) By means of trauma or of mechanical, thermal, chemical, or infective agencies, and also as a sequel of narrowness of the amnion, the top of the mesencephalic cerebral vesicle is damaged during the fourth or fifth week at the point of the greatest prominence, the largest surface, and the strongest growth of the cephalic end of the fetus. (3) The fact that the vast majority of cases of encephalocele are posterior thus becomes intelligible. (4) The degree of the damage is the determining factor whether the particular deformity shall be called encephalocele, hemicrania, meroacrania, acrania, etc. (5) Owing to the local damage the tissue cannot further develop into nervous tissue, cranium, and meninges; these tissues all become fused, and their growth is hindered. This must be the starting point of all encephalocèles. (6) The molding of the encephalocele further occurs exclusively from various causes: (a) from the growth of the remaining undamaged parts of the central nervous system. The consequently occurring pressure from within outwards steps in the sooner because the dura can no longer exert a normal counter-pressure; (b) from the traction of the surrounding part of the skin which in a much later stage grows very actively. The bony cranial case accommodates itself to the morphologically altered nervous system. Thus are explained the peculiar forms of the bony skull consisting of a general diminution, a more or less extensive defect of various cranial bones, and particular flexures that are regularly observed. The skin often hangs in thick folds on the skull, because its growth, except at the site of the lesion, is normal, while the cranial case is too small. (7) Owing to the interruption in the mesencephalon the parts of the nervous system proximal and distal of it can develop merely to a certain degree, and therefore they remain fetal. For their complete development there is thus necessary a mutual interaction between the parts. (8) Arnold's opinion that the pyramidal path is in direct contact with the root-cells of the ventral horn, according to which agenesis of this path causes reduction of the ventral horns, cannot be correct. In the writer's case there was complete pyramidal agenesis together with a powerful development

of the ventral horn. (9) The opinion of Von Monakow and Arnold that the development of Clarke's column is dependent on the cerebellum, and not on the cerebrum, is completely confirmed. (10) The vestibular reflexes are conducted partly by the vestibulo-spinal reflexes to the spinal cord, and partly by vestibulo-mesencephalic paths over across the posterior corpus quadrigeminum to the eye-muscle nuclei. The presence of the vestibular reflexes in the writer's case is thus easily understood (because these paths were fully developed). So, too, his findings are in agreement with the fact that a number of otolith-reflexes are lost. The centripetal paths along which they are conducted to the mesencephalon—chiefly the dorsal longitudinal bundle—are present; but, owing to the great defect in the cephalic end of the mesencephalon, all the centrifugal paths from it are not developed. This observation would thus show that the vestibular reflexes are transmitted along the vestibulo-spinal and the vestibulo-mesencephalic paths to the spinal cord and to the eye-muscle nuclei, but that these paths take no part in the transmission of the otolith-reflexes to the nuclei. (11) The occurrence of lateral grooves in the cervical spinal cord is dependent on a defect of development of the pyramidal paths. (The microscopical anatomy of the various cells and tracts is exhaustively worked out.) [Leonard J. Kidd, London, England.]

Nordentoft. ROENTGEN RAY TREATMENT OF BRAIN TUMORS. [Uges. f. Laeg., January 19, 1922, LXXXIV, No. 3; J. A. M. A.]

Nordentoft reviews the present condition of eighteen patients with brain tumors treated by roentgenotherapy before 1919. He also adds four new cases to the list. No benefit was apparent in seven in his first series, or it was transient, and in two others the disease proved to be disseminated sclerosis. The other nine patients were apparently cured by the irradiations, with earning capacity restored. A few still have some visual disturbance and one had much later an intercurrent cerebral hemorrhage which has partially incapacitated him. But the cases reported as cured in 1919 have persisted cured during the four, five, and six years since their treatment. Brain tumors seem to be especially susceptible to the roentgen rays, and when the tumor subsides under them, it displays no tendency to return. He summarizes the details of his cases; the location was apparently the cerebellopontile region, the parietal or frontal lobe or the cerebellum or hippocampal gyrus; the ages ranged from seventeen to fifty-one.

Rebattu and Ferrier. FRONTAL LOBE TUMOR SIMULATING MYOCLONIC LETHARGIC ENCEPHALITIS. [Lyon Médical, 1921, CXXX, p. 347.]

The writers report a case of a rapidly fatal right frontal-lobe tumor which simulated the myoclonic lethargic form of epidemic encephalomyelitis. A man, forty-two, of good antecedents, had acute frontal headache and somnolence. The diagnosis of myoclonic encephalitis was favored by his lethargy, myoclonic shocks in muscles of thighs, forearms,

and hands, hiccough, absence of any meningeal reaction, and subfebrile temperature. The headache, at first frontal, later became occipital. Pulse slightly slowed. Right pupil dilated. Eyes deviated to right. No vomiting. No Kernig sign. Two days after admission he passed urine involuntarily. Next day rigidity as of paralysis agitans. Two days later coma. On the sixth day after admission temperature rose to 41.8° C., and he died. Necropsy revealed a right frontal lobe tumor, probably gliomatous; otherwise the nervous system was normal. Noteworthy were the very rapid course of this latent frontal tumor, the absence of vomiting, the terminal rise of temperature, the originally frontal situation of the headache, and the close simulation of the myoclonic lethargic form of epidemic encephalitis. (By an accident the ophthalmoscope was apparently not used.) [Leonard J. Kidd, London, England.]

Maragliano. ENDOTHELIOMA OF THE BRAIN. [Arch. Ital. d. Chir., February, 1922, V, No. 1.]

A striking surgical result of the removal of a large-orange size tumor, an endothelioma, from a man of forty-eight years, located in the frontal and parietal lobes. Jacksonian attacks had begun about a year before. These were followed by paresis. The general condition grew worse until the man was entirely incapacitated. Because of hemorrhage at the first operation, five days intervened. The tumor had come into the surgical field in the interval. Four days later the flap was raised and the tumor was enucleated. It was vascular. Full earning capacity has been restored for eight months to date. The advantages of operation in several stages is discussed.

Lechner. ANGIOMAS IN THE BRAIN. [Beit. z. klin. Chir., 1922, CXXV, No. 1.]

An historical summary of fifty-six cases of angioma of the brain with a case of his own presenting the clinical history of an epilepsy. The angioma was found in the right temporal lobe with considerable softening.

Lafora, G. PHYSIOLOGY OF THE CORPUS CALLOSUM. [Madrid Letter, J. A. M. A., April 22, 1922.]

Lafora presented at the Royal Academy of Medicine of Madrid a report illustrated with moving pictures on experiments made on six monkeys, in order to study the function of the corpus callosum. Surgical operations were carried out by Goyanes, the surgeon of the General Hospital of Madrid, who made sections in the front, central, and posterior parts, both to the right and left of the falx cerebri. These experiments demonstrated that the section of the corpus callosum is followed in monkeys by a paralysis of the upper or lower feet, this depending on the location of the section, *i.e.*, the anterior or the posterior part. Besides, both the right and the left section are followed by a series of phenomena identical to those of crossed hemiplegia. These phenomena may be explained according to Monakow's theory that in cerebral injuries, besides

the local lesion, inhibitory phenomena are produced in structures connected directly with the injured site. As the monkeys do not have, as man has, a hemisphere controlling its mate, hemiplegic symptoms appear in them, after sections at the right of the falx cerebri. The location of these symptoms varies according to the site injured. In man, the control exercised by the left brain hemisphere causes the lesions in the corpus callosum to be accompanied invariably by right hemiplegia.

Goyanes. SURGERY OF CORPUS CALLOSUM. [Madrid Letter, J. A. M. A., April 22, 1922.]

Goyanes summarized his experience in the surgery of the corpus callosum, advising puncture and evacuation of the lateral ventricles in cases of hydrocephalus. He has performed this operation more than twelve times. In cases of acute hydrocephalus, this method may be followed by a cure, as happened with a patient who had choked disc and incipient optic neuritis. In a few days she was able again to detect the light, then color and shape of objects, and finally she was able to read without glasses. On the other hand, in congenital hydrocephalus, while the decrease of the cerebral pressure acts symptomatically, it is never curative, as illustrated by his twelve cases. He insists, however, that the operation, although not curative, is very beneficial, since it improves the patient's condition and relieves painful symptoms. Intracerebral pressure may be enormous in hydrocephalus. He has seen a case in which the fluid was so pent-up in the skull that it forced its way into the sheath of the olfactory nerves and came out through the nose in an almost continuous dropping. This relieved the patient so much that when a cold obstructed the nasal passages she always got worse; in fact, she died as the result of a cold. Goyanes has also resorted to the puncture of the corpus callosum in three cases of brain tumor accompanied by a marked increase of intracerebral pressure, which were not suited for radical surgery. Three also improved with this method. Goyanes recommends this form of operation, the technic of which is simple, in cases in which it is indicated.

Marie. NO PREFORMED CENTER FOR SPEECH. [Presse Méd., March 1, 1922, XXX, No. 17; J. A. M. A.]

In this article Marie denies that there can be in the human brain an inborn or preformed center for spoken or written speech, as there are centers for motor functioning. The psychic processes, he theorizes, are generated by a kind of vibration of the nerve elements, and these vibrations are propagated by a series of elaborating reactions to a large number of cells, which are thus roused to action by the initial volitional or reflex excitation. Among the arguments he cites against the assumption of a preformed center for speech is the evolution through the centuries of written language, through the hieroglyphs of Egypt to the ideographs, then to the syllabic phonetic writing derived from them. The flux and reflux of generations finally detached the letters from the syllables. Man

did not invent written language; it was the slow erosion of time that finally accomplished it, and even as late as the Middle Ages only the priests and the monks mastered it and taught it to their disciples. There was no hereditary transmission of it. The war experiences with thousands of men wounded in the head failed to reveal any instance of aphasia from a wound localized in the region of the third frontal convolution. It was the wounds of the left temporoparietal region, back of the fissure of Rolando, which were accompanied with aphasia.

Marie says further that the brain that served Broca for his first demonstration of "Broca's aphasia" is still to be seen in the museum. The softening process was old and extensive, but Broca was misled by Gall's phrenology to localize the seat of the aphasia in the frontal lobe, as apparently the point where the pathologic process had begun, disregarding all other parts of the brain. Marie adds that if there were an actual speech center in the brain, deafmutes would use some kind of speech, but we know that the sounds they make are less like speech than the sounds made by dogs. The deafmute has to be trained entirely from without. The infant shows also the total lack of any congenital speech center. Aphasia has never been known in a case of right hemiplegia that had developed in a young child. There is no speech center to be destroyed by the lesion causing the hemiplegia, and hence there is no aphasia. In learning to talk, the child used other parts of its brain. The nerve elements of the left hemisphere develop a little earlier than the right hemisphere, and the first mental processes thus begin here and form, as it were, a crystallization center and a base for the associations of ideas. Thus the brain uses this left hemisphere for an important part of its psychic activity, and specializes certain parts of it here, although there is no one special "center" for any of the psychic processes. The different cells of the brain join in an infinity of different psychic processes just as mathematicians use only ten figures for the most complicated calculations.

Tenani, O. TUMOR OF THE CORPUS CALLOSUM. [Tumori, January, 1921, VII, No. 4.]

This author, whose work with Mingazzini on the corpus callosum is incorporated in the latter's masterly study in "Der Balken," makes a summary of the tumors of the corpus callosum. In all 100 cases are reviewed and a personal case added. In his case the symptoms suggested a cerebellar tumor, but gliosarcoma, as large as a hen's egg, was found in the center of the reflected part of the corpus callosum. Lumbar puncture in his case, releasing 5 c.c. of fluid under high pressure, showed merely moderate lymphocytosis. The seat of the headache, the vomiting, the amblyopia, abducent paralysis, and paralysis of the left seventh nerve, tendency to deviate to the side, contracture of the muscles of the back of the neck, ataxic gait, Romberg's sign and vertigo pointed to a cerebellar site.

Sauve. EXTRACTION OF FOREIGN BODIES FROM THE BRAIN. [Bull. et Mém. Soc. Chir. de Paris, April 4, 1922.]

Five cases of intracranial foreign bodies treated by secondary extraction are here reported, all with recovery. In three fragments of shell were removed. From two revolver bullets were extracted. The indications for operating were: aphasia, eye symptoms, epilepsy, and in two cases persistent fistulae, one being associated with hemiplegia. The time after injury when operation was performed varied from thirteen days to ten months. The technic adopted was as follows: under general anesthesia a small trephine opening was made, the dura mater opened, and under screen examination the foreign body was caught with forceps in the brain. The foreign bodies were all fairly superficial, the deepest lying at a depth of 5 cm. In cases where infection was expected a drain was placed in the brain substance. All the patients recovered from the operation. With regard to end-results, a sufficient time has not elapsed since the operation to estimate the real value of their condition. However, several cases show an improvement of their previous nervous condition. The aphasia in one case has disappeared, whilst no epileptic fit has occurred for three months in the second patient. Operation has not improved the man with hemiplegia, whilst the patient with eye symptoms is better.

Brat, G. OTOGENIC BRAIN COMPLICATIONS. [Nederl. Tijdschr. v. Geneesk., July 23, 1921, H. 2, 530.]

Two cases are here reported. Case 1, a married woman, thirty-four, was discussed as one of serous meningitis by Klinkert at the Rotterdam Clinical Society. For three weeks much vomiting; became sleepy and dull at end of her third pregnancy; had headache, fever, complete left facial palsy with preserved Faradic irritability, slight neck-stiffness, Kernig sign, chronic purulent left otorrhoea with polypus formation, Weber (left), and an indication of amnesic aphasia. Normal fundi. On radical operation the focus did not reach the dura; normal dura; no pus on temporal lobe puncture. After operation the cerebrospinal fluid was almost clear, and contained a little globulin; positive Nonne. Recovery in spite of subsequent cystitis and pyelitis. Case 2, an under-harbor-master, sixty-five, while being syringed for (left) cerumen, had left otalgia, vertigo, and left facial paresis; a few days later he showed left cholesteatoma, left facial paresis, spontaneous nystagmus on looking to right; Weber more to right than left. Owing to his age, only very gradual removal of very many scales and polypi was attempted. Some weeks later, after cessation of treatment, he was found bed-ridden, had much earache and pronounced amnesic aphasia; no other brain symptoms. Radical operation showed a large cholesteatoma not reaching the dura; no pus on temporal lobe puncture. He improved, but the amnesic aphasia persisted. Six weeks later felt ill, was feverish, vomited, headache, quick pulse; died a month later. Necropsy: a large encapsulated

temporal lobe abscess undermining Reil's insula and Wernicke's center (without having given deafness or apraxia), and extending forwards into the uncinate gyrus. Medially, a second much smaller abscess, not connected with the first. No fistula found from the tegmen tympani et antri to the two cerebral abscesses. [Leonard J. Kidd, London, England.]

Cameron, J., and Nichols, A. G. PARTIAL ABSENCE OF CORPUS CALLOSUM. [Can. Med. Ass'n Journal, June, 1921, XI, No. 6; J. A. M. A.]

These anomalies were discovered in a girl, fifteen years of age, who had been an idiot from birth; never developed mentally from childhood, but was fairly well developed physically. Conversation showed a childish type of mind. She answered questions in monosyllables, followed by a childish grin. Her habits were dirty. She was always a heavy eater. She never showed any dyspnea. Menstruation occurred every two or three months, and was very profuse, simulating a hemorrhage and lasting a week. She was in good health until three weeks before her death. She complained first of headache, then of pain in the abdomen, which became greatly distended with gas. At first, there was diarrhea, later constipation developed. The temperature was variable, reaching at times 103 F. She appeared to be improving, but died suddenly while being bathed. Unlike children of her age, she did not enter into conversation with other persons, but her remarks were chiefly restricted to answering "yes" or "no" to questions asked her. She had a doll which she sang to—chiefly ragtime songs, which she had picked up, and familiar hymns, but the hymns were all mixed up, and she never sang a hymn through. She would talk a little when a conversation was begun by some one else. She had little reasoning power, and was quite excitable, laughing and calling at the boys playing on the lawn. She was impulsive, rather than lethargic; not quarrelsome, timid, and afraid of the water and of strangers. The body was sent to the medical school for dissection. Exploration disclosed the fact that the duodenum, when traced upward, disappeared into the thorax through what ought to have been the esophageal opening of the diaphragm. On opening the thorax the stomach was seen forcibly doubled on itself, lying within a peritoneal sac situated between the heart and the inner surface of the right lung and between the pericardial sac and the mediastinal pleura. This sac displaced the heart slightly to the left, and also gave rise to a deep permanent indentation on the inner aspect of the right lung below and behind its root. On opening the dura mater it was noted that the falx cerebri existed at its anterior and posterior ends. It was of crista galli, while its posterior end was merely $1\frac{1}{2}$ inches wide. On removal of the brain, it was observed that the arachnoid bridged across the longitudinal fissure throughout almost its whole extent, giving the impression that the mesial surfaces of the hemispheres were fused together. The anterior end of the corpus callosum immediately behind the genu was of normal thickness. About

half an inch behind this point, however, it faded away as a definite structure and was replaced by a lamina of gray matter at the bottom of the longitudinal fissure supported underneath by a thin layer of white matter and ependyma. Other evidences of the hydrocephalic condition usually associated with deficiency of the corpus callosum were found. A complete necropsy report of the case is given.

Campbell and Ballance. VENOUS ANGIOMA OF CORTEX. [Lancet, January 7, 1922, I, No. 5132.]

In this clinico-surgical report the authors report the case of a man who first showed weakness in the left arm and leg which progressively increased. Then he suffered from epileptiform convulsions involving the same side. Numbness in the left toes, which spread upward, was the initial sign. When it reached the left hand this closed; when it reached the left temple the head turned to the left and the mouth opened. Headache followed a fit. The diagnosis was a tumor involving the postcentral and precentral gyri. A venous angioma beneath the arachnoid membrane was exposed on operation, located in the ascending parietal gyrus.

Naunyn, B. ORIGIN OF HUMAN SPEECH. [Deutsches Archiv für klin. Med., August 12, 1921, CXXXVII, Nos. 1-2.]

In this medical philosophical discussion Naunyn queries, Why have higher animals not developed speech? An abyss separates them from even the lowest humans. Some casual anatomic factor seems to be the only explanation for the fact that the higher animals have not happened to use simple words to communicate simple ideas. The "da-da-da" of the happy babe is like the singing of the birds, and both display a tendency to copy others. One crowing rooster will start all in the neighborhood to crowing, and the babe soon tries to imitate the words it hears spoken. Why does the infant progress beyond this echo-speech to actual speech, while birds never do? Birds and humans have also in common the erect attitude, and they are the only ones that walk erect. Monkeys have four hands and no feet. The arms of the birds developed into wings, and they are used symmetrically. When man began to walk erect and use his hands, the right hand was found more convenient for attack and defense, gestures, and the ordinary uses of life, the left hand being used more for carrying things. This greater use of the right hand—not the more abundant blood supply in the left hemisphere; animals have the latter—was what stimulated the left hemisphere of the brain to higher development. This provided Romanes' "casual anatomic factor" that distinguishes man from animals and made articulate speech possible. It is a consequence of man's walking erect and using his hands as hands. Speaking and the organ of speech developed together. The singing of birds and their balancing power are by-products of the evolution of their organ of hearing, as also music in man, along with rhythm and dancing, although a muscle sense evidently coöperates with the internal ear.

5. ENCEPHALITIS.

Maggiore and Sindoni. ETIOLOGY OF EPIDEMIC ENCEPHALITIS. [La Pediatria, 1921.]

The authors having referred briefly to what has been given hitherto in regard to this disease report their practical bacteriological studies in the Pediatric Clinic of the R. University of Palermo. Their results are as follows: (1) It is possible during the acute period of the disease to isolate from the cerebrospinal fluid and the circulating blood of the patients with epidemic encephalitis a germ which in its morphological, by Noguchi in the Heine-Medin disease. (2) Such germs injected into experimental animals (rabbits) intracranially or intravenously reproduce the clinical picture obtained in the ape through intracranial injection of cerebral emulsion from a patient with Heine-Medin disease. (3) The reproduction of the disease takes place whether from inoculation with the germ obtained in culture or from injection of the cerebrospinal fluid or the blood. The disease may be reproduced even by passing it on from one animal to another. (4) The anatomopathological report in regard to the nervous system of the infected animals given by A. Dionisi, Director of the Institute of Pathological Anatomy of the University of Palermo reveals macroscopically intense hyperemia of the brain, as well of the white substance as of the gray, more intense in the latter and punctiform hemorrhage. Microscopically there appear in the cerebrum, cerebellum, medulla oblongata, spinal cord: (1) Constancy of alteration in the meninges represented (a) by intense vascular hyperemia, (b) scattered hemorrhage and focalized around the meningeal vessels, (c) polyblastic infiltration of the minute veins. (2) In the gray matter of the cerebral and cerebellar substance, and sometimes in the white matter, always hyperemia of varying degrees, polyblastic infiltration, always in monostatification and not diffused to the entire vascular wall. The result of these researches corresponds in general with those of Strauss, Hirschfeld, and Loewi in America and with the more recent ones of Levaditi and Harvier.

The authors base themselves upon the characters of the pathogenic germ, upon the characteristics of the anatomic lesions which this produces, upon the production of the clinical picture in the experimental animals and draw from such facts the conclusion that epidemic encephalitis and the Heine-Medin disease may be considered identical. They reinforce their method by comparing with the form described by Wickmann in regard to the Heine-Medin disease in which are revealed clinical types with cortical determination, types with bulbar or pontine determination, meningeal types, polymyelitic types, peripheral types, ataxic types, abortive types.

Thus, weighing all the characteristics reported upon, it is easy to unify

this nosographic conception. In both of the diseases we have to do with a disorder of an infectious type with the portal of entrance in the nasopharyngeal cavity and a secondary localization in the nervous system. If a difference exists it reduces itself to the fact that in epidemic encephalitis differently from that which happens in the Heine-Medin disease there occur attacks with the same frequency in infants as well as in adults, that in the actual epidemic there has been in general prevalence of the encephalitic form over the medullary or peripheral and a prominent symptom has often been the symptom of somnolence. The authors attribute this peculiar behavior of the disease to biological variation of the germ in regard to its pathogenicity and affinity for the nervous substance of the adult. [Author's abstract.]

Hauser, G. H. LUMBAR PUNCTURE IN EPIDEMIC ENCEPHALITIS. [New Orleans Med. and Surg. J., LXXIV, 1921, p. 5.]

The spinal fluid in this observer's cases of encephalitis were found to be clear and usually under considerable pressure. There was no coagulum or film formed on the fluid standing. The cell counts were normal or showed but a moderate pleocytosis. In none of the cases studied did it exceed 11 per cubic millimeter. The prevailing cell was the lymphocyte. Globulin was not increased in any of the cases. All fluids gave a positive Fehling's test. The Wassermann was negative in all cases. The colloidal gold reaction was negative. This confirms the belief that the spinal fluid increase is the result of hypersecretion and not exudative in character, as meningitis always produces a curve in the meningitis zone. In the writer's cases it was noted that following spinal puncture and drainage of the canal, immediate beneficial results followed, irrespective of other therapeutic measures. The improvement in some cases was continued without further withdrawal of fluid. In two cases it was necessary to repeat the puncture and drainage to hasten recovery. It was noted, however, that the patients in whom it was necessary to puncture more than once did not relapse to their former mental state, but remained stationary, which condition necessitated further drainage. In some cases as much as 40 to 50 c.c. of fluid was removed at one time.

Morse, P. F., and Crump, E. S. BACTERIOLOGY AND PATHOLOGY IN SIX CASES OF ENCEPHALITIS LETHARGICA. [J. Lab. and Clin. M., 1920, V, 275. Med. Sc.]

A staphylococcus-like organism has been isolated in primary pure cultures from six consecutive cases dying of encephalitis lethargica. The organism when injected subdurally in rabbits produces a fatal lethargic state. The filtered culture contains a poison which is fatal to rabbits when injected by the intradural route. Evidence points to the poison being a toxin rather than a filtrable virus. Agglutination tests were not conclusive.

The pathological findings showed a low-grade leptomeningitis with

edema and moderate round-cell infiltration; perivascular infiltration of the vessels of the white matter, especially of the caudate and lenticular nuclei, optic thalamus, pons, medulla, and posterior horns of the cord, with resulting edema and miliary hemorrhages of the surrounding parts.

Nikula, A. EPIDEMIC ENCEPHALITIS. [*Finska Lakar Hand*, November-December, 1920.]

Nikula reviews the present status of epidemic encephalitis, and Pipping reports three severe cases and two mild ones in children at Helsingfors.

Fourrier, M. TREATMENT OF LETHARGIC ENCEPHALITIS BY NEO-SALVARSAN. [*Bull. Soc. de Thérap.*, April 14, 1920.]

A clinical report of a girl seventeen years of age, who showed typical signs of epidemic encephalitis with a lethargic trend. Urotropine by mouth seemed to have no influence on the process. Injections of camphorated oil were also of no avail. Improvement followed immediately on an intravenous injection of 0.30 cg. neo-salvarsan, and became more pronounced after two more injections, with complete recovery later.

Stieffer and Szigeti. ENCEPHALITIS LETHARGICA. [*Wien. klin. Woch.*, April 1, 1920.]

In two separate contributions these observers describe cases occurring during a recrudescence of the Vienna epidemic which took place in January and February of 1920. The clinical features did not differ greatly from those recorded elsewhere throughout the world. A large proportion of patients showed choreiform or athetotic movements at some stage of the disease, and in two instances the involuntary muscular contractions resembled those seen in myoclonus. Mental symptoms such as delirium, amounting almost to mania, seemed to have been common. At one time or another sleepiness was observed in most of the cases, and nearly all had severe or mild ocular palsies. Spinal trends were also noted. Sequelæ seemed fewer. The abdominal and muscular pains were complained of. Szigeti makes the suggestion that a link exists between epidemic encephalitis and influenza—a theory which has found support in many places. The chief interest in the papers lies in the various forms of treatment adopted. Salvarsan and intravenous injections of anti-streptococcal serum met with no success. One case died shortly after intravenous administration of salvarsan. Szigeti treats symptoms by hypnosis. In his experience noisy delirious patients who are quite unaffected by drugs yield easily to hypnotic suggestion; sleep is induced, and on waking they showed marked improvement. For drowsiness he recommends lumbar puncture with fairly extensive withdrawal of fluid. The patient is said to come out of his stupor, his tongue cleans, and he takes an interest in his surroundings. The improvement lasts two or three days, when the puncture has to be repeated.

BOOK REVIEWS

Brigham, Carl C. A STUDY OF AMERICAN INTELLIGENCE. [Princeton: Princeton University Press.]

One might write a most scholarly review of this really most thorough and interesting study. We shall refrain because it would avail little more than saying that it is a study that should be in the library of every worker in human behavior problems.

One quotation we deem worthy of quoting:

"According to all evidence available, then, American intelligence is declining, and will proceed with an accelerating rate as the racial admixture becomes more and more extensive. The decline of American intelligence will be more rapid than the decline of the intelligence of European national groups, owing to the presence here of the negro. These are the plain, if somewhat ugly, facts that our study shows. The deterioration of American intelligence is not inevitable, however, if public action can be aroused to prevent it. There is no reason why legal steps should not be taken which would insure a continuously progressive upward evolution."

"The steps that should be taken to preserve or increase our present intellectual capacity must of course be dictated by science and not by political expediency. Immigration should not only be restrictive but highly selective; and the revision of the immigration and naturalization laws will only afford a slight relief from our present difficulty. The really important steps are those looking toward the prevention of the continued propagation of defective strains in the present population. If all immigration were stopped now, the decline of American intelligence would still be inevitable. This is the problem which must be met, and our manner of meeting it will determine the future course of our national life."

Hirschfeld-Magnus. JAHRBUCH FÜR SEXUELLE ZWISCHENSTUFEN. Vol. XXIII, 1923. [Stuttgart: Julius Püttmann.]

The present volume contains a series of contributions with a bibliography, as has been its modus since its beginning. Hirschfeld writes on "Die intersexuelle Konstitution," Weil on "Sex Determination and Intersexuality," Kronfeld on "Metatropic Women," Jordon on "Masochistic and Sadistic Reciprocity," and also on "Some New Conceptions in Sexual Research." The material still remains much at the raconteur level.

Benon, R. L'ALCOHOLISME CÉREBRALE. [Paris: Octave Doin.]

Dr. Benon, who has contributed much to our knowledge of deliria, mental confusions, amnesias, fugues, organic dementias,

including paresis, epilepsy, and many other psychiatric problems, here presents a book of 373 pages upon the various psychical pictures due to acute and chronic alcoholic intoxication, concerning which he has already contributed a score of valuable studies.

The propaganda against alcohol in France seems to stir up the same antagonisms that we find in the United States, and after a period of abatement of alcoholism, 1916-1919, in France, one of increased opportunities for studying its clinicotoxic forms has supervened.

The descriptions follow the generally accepted classifications. They are very direct and practical and the illustrative material is well chosen. A very readable, practical monograph.

Parhon, C. I. et Goldstein, M. TRAITÉ D'ENDOCRINOLOGIE. Tome I. La Glande Thyroïde. [Jassy, Roumania: Viata Romineasca.]

Parhon and Goldstein, singly or in combination, have been contributing most excellent studies to our advancing body of endocrinology. Their 1909 monograph, "Les Secretions Internes," stamped them as careful clinicians and original observers and experimentalists.

Now they apparently plan an extensive work, the first fascicle of which (of 450 octavo pages) is devoted entirely to a consideration of the thyroid. It contains a great mass of material of much interest, and we await further contributions for a more extended review.

Feuchtwanger, Erich. DIE FUNKTION DES STIRNHIRNS. IHRE PATHOLOGIE UND PSYCHOLOGIE. [Berlin: Julius Springer.]

A book of 194 pages, Heft 38, of the Foerster Wilmann's Monograph Series, which contains a scholarly, well-proportioned, and quite adequate summary of the chief functions of the frontal lobes.

The author reminds us that as late as 1912 Brodmann comes out squarely and states that the true functions of the "Regio frontalis" are almost unknown. The war permitted the author to gather careful studies of 200 cases of frontal lobe injury and to follow them in some instances for a number of years. It is on the basis of this clinical material this interesting monograph is prepared.

A quick summary of brain lesions enables one to separate a parietal occipital type from a frontal type. In the latter, losses of attention, variations in mood, up or down, apathy, slowness of motion and grasp, "witzelsucht," and some equilibrium changes are found, whereas in the former the various types of speech disturbance, sensory disorders, thinking anomalies, epileptic attacks, and various psychogenic difficulties are more frequent. In the "regio frontalis" injuries themselves higher figures for left-sided injuries are found in disturbances of attention, hastiness, slowing, "witzelsucht" and equilibrium changes. About of equal occurrence in both hemispheres he finds the excitement and euphoric states and depressions.

There is no doubt that the frontal lobes have equilibrium functions. It is a central station for the cerebellum—the end of the fronto-cerebellar tract (Bruns), and not a telencephalic portion of

the vestibular apparatus. Whether this equilibratory function is localized or not is not certain. Conjugated eye-movement disturbance is probably positive. Smell disturbances—olfactory peripheral—loss of the abdominal reflexes and vasomotor disturbances are not yet understandable.

Hypomanic "moria," joking trends, with changes of mood and eroticism, depressive states, aboulia, apathy, akineses, schizophrenic-like states, psychopathic states, hysteroid states, and disturbance of intellectual accomplishment are undoubted. Witzelsucht, he is inclined to believe, is specific. Other cases—tumors in other regions—he believes may have involved the frontal regions. The psychical defects he thinks are specific, not "released," of more unconscious combinations. In this stand he closely follows Kraepelin and the Munich school.

Fundamental differences between left and right, inner localization possibilities, cortical and subcortical differences, still remain uncertain. "No symptom" cases become fewer and fewer as one studies the cases more carefully. Brain tumors are the least satisfactory objects for careful study. The "diaschisis" symptoms are too misleading.

Further analysis we cannot give, but recommend this very suggestive and valuable monograph.

Schade, H. DIE PHYSIKALISCHE CHEMIE IN DER INNEREN MEDIZIN. Dritte, vermehrte u. verbesserte Auflage. [Dresden and Leipzig: Theodor Steinkopff. \$3.65.]

Modern medicine is coming more and more to rely upon physics and chemistry, and the present-day student must ground himself in physicochemical data of which his forebears had no inkling.

A new era of molecular pathology has opened up, and although as yet its influence upon therapeutics lags somewhat, this practical issue is bound to be met, particularly when the vegetative nervous system in its relationships to this molecular pathology (*i.e.*, metabolism) will be the more firmly grasped.

A revived Brunonian movement in medicine is evident. The human body is not a closed system. It is a transformer, and when this will be grasped more thoroughly the kind of instruction that works of this nature afford will be of practical use in therapeutics.

In its new third edition it stands as the best text of its kind. We would like to see it in English dress.

Weil, A. SEXUALREFORM UND SEXUALWISSENSCHAFT. [Stuttgart: Julius Püttmann.]

This volume of 286 pages contains a series of papers presented to an "International Society for Sexual Reform on a Scientific Sexual Science Foundation."

Magnus Hirschfeld opened the Congress; then follow papers on *Internal Secretions and Sexuality*, by Lipschütz, Biedl, Weil, Schmidt, Littauer, Stabel, Gassul, Rogge, and Prussep; *General Sexual Reform*, by Ehrenfels, Stöcker, Rutgers, Ischloudski, Vaerting, Friedländer, Kronfeld, Schwarz, and Müller; *Legal Reforms*,

by Werthauer, Dehnow, Hiller, Schweitzer, and Niemann; *Social Politics and Birth Regulation*, by Goldstein, Brauer, Knack, Rosenthal, Rohleder, Fraenkel, and Dührssen, and finally papers on *Sexual Pedagogy*, by Kronfeld, Saaler, Döring, Uhlmann, and Kirchoff.

The collection is of much interest, even if somewhat general.

Peterson, Frederick, Haines, Walter S., and Webster, Ralph W. *LEGAL MEDICINE AND TOXICOLOGY*. Second Edition. 2 vols. [Philadelphia and London: W. B. Saunders Company.]

The first edition of this work appeared twenty years ago. It was well received and required three successive reprintings. A second edition being called for, Dr. Ralph Webster, Assistant Professor of Medical Jurisprudence, became the associate, and it is due to his efforts that this masterly work appears in an entirely rewritten, revised, and up-to-date form.

There are forty-two contributors to this 2,000 and more page encyclopedia. Their contributions cannot be particularized.

New articles not appearing in the first edition are upon Protein Poisoning, Common Law re Pharmacists, Identification of the Living, Forensic Problems of Poisoning, Industrial Poisoning, Legal Rights and Obligations of Physicians. This chapter, written by the late Dr. H. N. Moyer, should be read by all physicians.

If physicians are still unable to get together for their common good, and unable to overcome their envies by so acting in common, they should at least know what common rights the law has given them.

Volume I is chiefly related to neurological, psychiatric, and legal problems; Volume II, chiefly to toxicological considerations. Since these latter have become of increasing importance, due to the expansion of the chemical industries, this volume has been greatly augmented.

Most of the papers have been thoroughly revised and brought to date.

This work will be found indispensable as one of reference.

Lay, Wilfred. *A PLEA FOR MONOGAMY*. [New York: Boni & Liveright.]

We have noted this author's other works in this place. Those of his earlier period contained his entire message. The others have been but reduplications of the primary ideas in different settings. This time the wrapping is marriage. As we untie its pages we find many words, some ideas, but few real novelties. Not that it is worthless by any means; in fact, there are many, many pages that can be read by most people to advantage, and the ideas would stick if the general style had more coherence; instead it is broken up into a series of about 200 longer or shorter epigrammatic apodictic utterances which bear little organic relationship one to another.

Blondel, Ch. *LA PSYCHANALYSE*. [Paris: Felix Alcan.]

This is the second or third thoroughly French effort to present the Freudian doctrine of psychoanalysis. We have read it carefully. It

is a "writing table" criticism. It shows not the least scintilla of evidence that the author knows anything about actual analysis from personal experience. It is a negative vote from *a priori* prejudices; interesting as a personal document, but of no value concerning what may really be learned by an application of the principles.

Davenport, C. B. BODY BUILD AND ITS INHERITANCE. [Washington, D. C.: Carnegie Institute.]

This is an interesting and valuable study which grew out of the recruit examinations of the war. The enormous variations in body build challenged Davenport's inquiring mind, and naturally he turned to heredity as a principle of at least partial explanation. This he finds verified by his extensive studies, which are here presented in great detail. He does not assume that heredity is the sole factor, but it is not a negligible one, as is maintained by some internists. Genetically, build is determined by multiple factors, fleshiness tending to dominate slightly over slenderness. Endocrine factors need to be more carefully sorted out.

Weigeldt, Walther. STUDIEN ZUR PHYSIOLOGIE UND PATHOLOGIE DES LIQUOR CEREBROSPINALIS. [Jena: Gustav Fischer.]

Just preceding the war Strümpell inaugurated a series of studies from his Leipzig clinic. This is Volume VI and deals as an inaugural thesis with the cerebrospinal fluid in all of its aspects, but pays particular attention to the cell content as determined by localization and with the albumen content.

Of the now accumulating monographs upon the cerebrospinal fluid, this may be considered as one of the most thorough. It is particularly gratifying in form and no less so in content. The modern student of the cerebrospinal fluid cannot afford to overlook it.

Williamson, R. T. ENGLISH PHYSICIANS OF THE PAST. [Newcastle-upon-Tyne: Andrew Reid & Company.]

We call attention to this small brochure containing short sketches of the life and work of Linacre, Gilbert, Harvey, Glisson, Willis, Sydenham, Mead, Heberden, Baker, the Lathams, and Bright, chiefly because they come from one of us, *i.e.*, an English neurologist of much ability who has contributed largely to the knowledge of the disorders of the spinal cord and shown us the great value of the tuning fork in neurological semeiology.

The sketches themselves are full of charm.

Muskens, L. J. J. EPILEPSIE. VERGELIJKENDE PATHOGENESE, VERSCHIJNSELEN, BEHANDELING. [Amsterdam: F. Van Rossen.]

Of recent years we have had no monographic presentation of the subject of Epilepsy. With Binswanger's tome it would have seemed that all had been said. In a sense his volume closed the descriptive era.

Newer viewpoints have appeared since this, however; viewpoints which the work of Sherrington, principally, has oriented to entirely

new fields in the cultivation of which, for the understanding of the epilepsy problem, the author has entered with singular facility and pertinacity.

A pupil of Winkler's and Jelgersma's, and also at one time with Dana in New York, Muskens has for a number of years pursued a series of investigations bearing on the problems of epilepsy, which from the physiological and anatomical sides have been of great scientific interest. These he has here collected in a monograph of 500 pages. They deal primarily with myoclonic convulsive seizures experimentally induced with various toxic substances, such as bromcamphor, strychnine, absinth, and other narcotics, and are recorded in great detail in Section 1, pages 1-116, of this monograph.

Section 2 deals with anatomical considerations of involved pathways (pp. 32-225).

Section 3 takes up the epileptic disturbances of medical interest and deals rather diffusely with classifications from different aspects. Several chapters are devoted to the different types of epileptic attack. The author has included insulin attacks, an evidence he is up to date.

Chapters 12 and 13 deal chiefly with Treatment.

As the work is written in Dutch the reviewer's superficial knowledge of this language does not permit him more than a very cursory insight into its merits.

We can hope to see it in English, as there is no subject in neuropsychiatry of more practical value than that of the understanding and treatment of the individual epileptic.

Turner, Julia. *THE DREAM ON THE ANXIETY HYPOTHESIS.* [London: Kegan Paul-Trench-Trubner Co. 2 shillings.]

The "dream is the cradle of the human mind"; "it is like a scene from a drama"; "the dream life resembles a dramatic cycle"—these are excerpts from some of the opening statements of this very simple and clear little primer concerning the "dream" as seen from the general freudian point of view. It is a well-written entertaining small book.

Clark, L. Pierce. *PSYCHOLOGIC STUDIES OF NOTABLE HISTORIC CHARACTERS.* [Privately Printed.]

This brochure contains reprints of Clark's Studies on Lincoln, the Epileptic Personality in the Genius, Dostoevsky and Napoleon, and Julius Caesar being discussed; and on the Narcism of Alexander the Great. A fourth illuminating paper, by H. E. Barnes, on the Service of Analytical Psychology to History, is included.

Together they constitute a notable contribution to analytical psychology.

Dercum, Francis X. *THE BIOLOGY OF THE INTERNAL SECRETIONS.* [Philadelphia and London: W. B. Saunders Company.]

Dercum is always easy and pleasant reading. He says things in a direct and forceful manner even if not very profound and at times not particularly sound, yet in a field still so full of speculation his

guess is about as good as many others. It certainly has the advantage of comprehensibility, which cannot be said for many similar efforts.

These essays make a simple, at times naïve, approach to larger, more serious treatises on the subjects of the endocrinopathies, sympathetic nervous system, and other related problems; somewhat loosely strung together, but perhaps all the more suggestive for that.

Mesdag, M. J. BIBLIOGRAPHIE VAN DE WERKEN VAN NEDERLANDSCHE SCHRIJVERS OP HET GEBIED DER NEUROLOGIE EN PSYCHIATRIE EN CRANVERWANTE VAKKEN.

Two more volumes of this bibliography of Dutch workers in neurology and psychiatry have been received. Nowhere do we know of any similar collection of the work done by any group of workers in a given specialty.

A Semi-Centennial Volume of the American Neurological Association contains bibliographies of its members, but no such valuable witness of any band of workers has yet appeared comparable to that of these present volumes.

It is surprising that so small a country should have had so active a band of scientific workers in a field of medicine of but fifty years in the making. We congratulate our Dutch compatriots upon this showing.

Kronfeld, Arthur. KLEINE SCHRIFTEN ZUR SEELENFORSCHUNG. Heft 1-6. [Stuttgart: Julius Püttmann.]

This is a new series consisting of small brochures dealing with psychological and psychiatric problems which makes no claim for exhaustive completeness. In fact, they are more or less popular in type, yet may be considered scientific. Volume I, by Dr. Th. Friedrichs, deals with the Psychology of Hypnosis and Suggestion. It follows more closely the general conceptions of Schilder and is conceived along lines compatible with Varhinger's general philosophy of the "As If." It is quite suggestive even if not strictly belonging to the psychoanalytic school. Volume II, by Kronfeld, deals with the general problem of Narcissism and Homosexuality, somewhat in the spirit of Carpenter's neohellenic appreciation. It teaches greater tolerance and understanding of the universally present homoerotic component in the still adolescent human race. Volume III deals with Mediums and Occultism in general. It is by W. Haas, and in general points to the general thesis that with the advances in biological science, especially with greater knowledge of dissociation, the phenomena are becoming better and better appreciated as non-mystical and interpretable from the "wish" standpoint.

Volume IV, by W. Lurje, deals with Mystic Thinking, Mental Disease, and Modern Art. Storch, in his recent monograph on Archaic Forms of Thinking in Schizophrenia—see Monograph Series No. 36—has explored this territory quite exhaustively and advantageously.

The Problem of the Unconscious, by G. Roffenstein, is Volume V. It is an exceedingly valuable and modern contribution to this

group of problems which Freud's studies have put in the focus of psychological interests.

Volume VI, by Kronfeld, on the "Abnormal and Society," constitutes an interesting program of social psychopathology towards which all psychiatric thinkers are tending.

The series afford in compact form fascinating suggestions of up-to-date problems by seriously minded and competent students.

Dattner, B., Kauders, O. KLINISCHE U. EXPERIMENTELLE STUDIEN ZUR THERAPEUTISCHEN INSPF-MALARIA. [Wien: Franz Deuticke.]

An interesting résumé of experimental studies in v. Jauregg's malarial treatment of general paresis which cannot but be of interest to all neuropsychiatrists in view of this newly opened up line of research.

Wada, Tokujiro. ANATOMICAL AND PHYSIOLOGICAL STUDIES ON THE GROWTH OF THE INNER EAR OF THE ALBINO RAT. American Anatomical Memoirs. [Philadelphia: Wistar Institute.]

This study is concerned with the age changes in the organ of Corti and the associated structures. They show the wave of growth that occurs in the membranous cochlea, and some effort is made to correlate these changes with the physiology of hearing. It is a painstaking and minute study of interest to anatomically interested neurologists and otologists.

Haecker, V. and Ziehen, Th. ZUR VERERBUNG UND ENTWICKELUNG DER MUSIKALISCHEN BEGABUNG. [Leipzig: Johann Ambrosius Barth.]

A fascinating and thorough study of musical talent from the genetic point of view. Geneticists will be much interested, neurologists content to accept the conclusions that a certain Mendelian typus is followed, chiefly the "Pisum" type. Adler's notions concerning organ inferiority and psychical compensation receive some support. Mathematicians, in general, are not musically inclined, confirming in minor respects Jung's general thesis concerning psychological type differentiations. Musical and graphic inheritance (illustrators, artists) in men are allied closely—poets and musicians more so. Among women these correlations are less close. Onuf has claimed certain relationships between musical talent and the manic-depressive temperament. These studies sustain this contention in part, especially with relation to the depressed types.

An extremely interesting and valuable contribution.

Kümmel, Prof. Dr. DIE ERKRANKUNGEN DES INNEREN OHRES UND DIE PSYCHOGENEN HÖRSTÖRUNGEN. [Georg Thieme.]

Schwalbe has been editing a series of volumes on diagnostic and therapeutic mistakes and of their avoidance. The present small brochure deals with diseases of the inner ear which are of mental origin and which are treated *ad nauseam*, by regulars, quacks, and

ear trumpet mechanics, ignorant of the fact that the ear, no less than any other part of the body, may be made the scapegoat of the spirit.

Although the author is far from being in touch with the researches of the analytic psychology regarding the inner significance of what he lightly terms "subjective" disturbances, the fact that they are recognized as present, and as being "subjective," is enough for those who would search for a deeper understanding of the etiological factors.

Delgado, Honorio F. REHUMANIZACION DE LA CULTURA CIENTIFICA POR LA PSICOLOGIA. [Lima, 1923.]

This charming doctorate thesis of Delgado's presents a picture not only alluring but also fundamental. When it is recalled that in South American countries there were founded institutes of learning and culture nearly two centuries before those of more recent and rapid efflorescence above the equator, it should not be surprising to meet with a modern representative of this culture. Dr. Delgado had here presented a thesis that the rehumanization of culture is to come through the psychological sciences. We agree with him, and although, personally, we are less optimistic, agreeing in part with that cynicism that notes J. Harry Robinson as describing mankind in the "monkeying" rather than in the "making," nevertheless Delgado has sketched a program containing much stimulus.

We extend to our South American confrère our sincerest felicitations and congratulations on his recent thesis.

Dragotti, Giuseppe. LA PSICANALISI. [Roma: Luigi Pozzi.]

Psychoanalysis has commenced to penetrate the Latin countries, and the present author presents in the shape of a brochure of some eighty pages an excellent summary of the psychoanalytic principles.

It is very well done, for the most part conservative, and shows that the author's acquaintance with the literature is not his only credential. Although there is little evidence of his actual participation in the analytic technique, he has an open mind, and apart from certain fixed ideas regarding causality he is not unfair to the general picture.

Pierce, Bedford. ADDRESSES TO MENTAL NURSES. [London: Bailière, Tindal and Cox.]

This is a unique book. It is not one the smaller fry of the order. It not only is conceived in a very ingenious manner, but its subject matter is quite extraordinary.

It contains fifteen lectures to nurses of the Retreat, York, one of the oldest psychiatric hospitals of England, which have been delivered by eminent psychiatrists over a period of years. Thus the editor starts off with Pinel and Tuke. Yellowlees follows. Bevan Lewis has a splendid chapter on Character Formation, and Clouston a masterly talk on How the Scientific Way of Looking at Things Helps Us in Our Work. Similarly there are lectures by Percy

Smith, Mercier, Hubert Bond, Savage, Macpherson, Middlemess, Henry Yellowlees, Devine, Armstrong Jones, and a talk on the Ductless Glands by Marguerite Wilson. This is an interesting historical document.

Janet, Pièrre. LA MEDECINE PSYCHOLOGIQUE. [Ernest Flammarion, Paris.]

A charmingly written superficial discussion of the whole manifest content of various movements called psychological modes of treating disease, with hardly a glimmer of the dynamic significance, or lack of it, of any of them. It is quite on a par with the thinking of the masses relative to the whole subject because it deals, as do most of the works of this stage, solely with conscious rationalizations and theological-academic psychological concepts. All that Janet does is to systematize his material better, but his ideas of the differences in the conceptions underlying the works of Dejerine, Dubois, Mrs. Baker Eddy, Freud, or others, is as confused as those of the average layman.

It bears as much relation to real psychological medicine as the kitchen does to the chemical laboratory. It makes a saleable book as the kitchen may turn out a good pudding, but it is not thinking in terms of real causality.

Mutel, M. ETUDES MORPHOLOGIQUES SUR LE RHINENCÉPHALE DE L'HOMME ET DES MAMMIFERES. [A. Humblot et Cie, Nancy, 1923.]

This is a thorough monographic presentation of the general morphological features, with certain microscopical details of a number of forms, including man, some reptiles, chenoptera, insectivora, carnivora, rodents, and ungulates. It presents certain features of interest, notably the (1) value and significance of the commissures of the olfactory cortex, (2) the pathways of the olfactory striae, (3) the morphology of the posterior olfactory lobe, (4) the variations of the limbic lobe, (5) the anatomical value of these formations at the level of "limbe cortical secondaire."

It is a valuable contribution to comparative neurology.

N. B.—All business communications should be made to *Journal of Nervous and Mental Disease*, 64 West 56th St., New York.

All editorial communications should be made to Dr. Smith Ely Jelliffe, Managing Editor, 64 West 56th St., New York.

The Journal OF Nervous and Mental Disease

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ORIGINAL ARTICLES

THE RELATION OF THE CEREBELLUM TO THE STATIC SYSTEM AND ITS RÔLE IN POSTURE-SYNERGY *

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OF NEW YORK

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INTRODUCTION

Since the early experimental studies of Magendie and Flourens, the cerebellum has been regarded as an organ presiding over the muscular activities of equilibrium and locomotion. Yet the exact nature of the rôle which this interesting structure plays in motility has been the subject of considerable controversy, and the problem still remains unsolved.

The fundamental investigations of the Italian physiologist Luciani (1) and his famous triad of symptoms, atonia, asthenia, and astasia, represented an immense advance in the finer interpretation of cerebellar phenomena. The clinical aspects of the subject were still further advanced by Babinski, (2) and asynergia, hypermetria, and adiadokokinesis are now recognized symptoms of a cerebellar disorder. In his studies the symptomatology was not only enriched but cerebellar symptoms were reduced to their finer elements.

Many other conceptions of cerebellar function, all rather closely related to one another, have been advanced by other investigators. Among the more important of these may be mentioned the stato-tonic function of the cerebellum as conceived by Edinger, (3) and its sthenic function as interpreted by André-Thomas. (4)

Mention should also be made of the fundamental contribution to

* Read at a meeting of the New York Academy of Medicine, on March 6, 1924.

this subject by Ingvar,(5) who concluded that the cerebellum is an organ regulating the static and dynamic equilibrium of the body masses.

In 1914 Mills and Weisenburg (6) emphasized the important clinical fact that all disturbances of cerebellar origin were essentially of the same nature, and referable to a disorder of muscle synergy. They regarded asynergia as the essential syndrome of the cerebellum.

In 1919, Tilney,(7) as a result of clinical and experimental studies, advanced the conception of the synergic unit with its dominant and check mechanisms, the regulation of which he ascribed to the cerebellum.

In the present study it would carry us too far afield to do more than outline a few of the more important contributions to the function of the cerebellum. Nearly every experimental investigator of note has made some contribution to this subject, and those of more recent origin practically agree that the cerebellum is an organ which plays a preponderant rôle in the coördination of muscle tone and synergy, especially as it relates to equilibrium and locomotion.

The conception of cerebellar function, which I put forth in my presidential address to the American Neurological Association in 1920,(8) is, in many respects, similar to those of my predecessors. It differs, however, in strictly limiting the function of the cerebellum to the coördination of static or *posture-synergy*, as distinguished from kinetic or *motion-synergy*, which I believe is under the control of other mechanisms.

As a result of my investigations of the efferent system,(9) I have divided the function of motility into two components, both of which I believe are represented at all levels of the nervous system—vegetative and cerebrospinal. This theory implies the existence of separate neural and muscular mechanisms subserving respectively the functions of motion and posture.

According to this point of view, there is a certain homology between the motor and the sensory systems. In the sphere of sensation we recognize different modalities of function, such as touch, pain, and temperature, which are subserved by special systems. So in the motor sphere I would recognize two modalities of function subserved by special neural systems, and special end organs. One of these is the movement proper, which is under the control of the KINETIC system. The other is a more passive form of contractility, underlying posture, which is subserved by the STATIC system. The term static is used here to designate that property of the muscle fiber

by which it becomes fixed in posture, in contrast to that other function which is contractile and the cause of motion. Motion, therefore, is the active and posture is the passive form of contractility, while muscular activity as a whole is a combination of these two mutually coöperative functions.

The Kinetic System.—The kinetic systems of motility are concerned with the transmission of impulses underlying movement. The primitive reflex mechanisms subserving movement are represented in the spinal cord and brain stem, and in my nomenclature are termed the *archeokinetic* system. The higher motor centers for the control of kinetic function are represented in the corpus striatum and the Rolandic areas of the cerebral cortex. The corpus striatum, with its cortical and spinal connections, represent the *paleokinetic* or older motor pathways, while the Rolandic areas of the cerebral cortex and the pyramidal tracts represent the neokinetic systems. The paleokinetic system presides over automatic and associated types of movement and the neokinetic system over the isolated synergic activities of muscles. These various types of movement merge by imperceptible gradations into one another, and movement of the organism as a whole represents a coördination of all these elements in harmonious coöperation.

It may be stated, as a general principle of symptomatology, that a lesion of the kinetic system causes a disorder of movement.

The tendon reflex, clonus, and tremor are referable to the kinetic system, as are also such spasmodic disorders of motility as fibrillary twitchings, myokymia, myoclonus, and convulsive manifestations.

The Static System, on the other hand, controls the static or posture functions of motility. The essential integrating and correlating mechanism of this system I believe to be the cerebellum. This organ is in direct communication by efferent systems with various regions of the cerebral cortex. It is also in communication with the proprioceptive systems of the spinal pathways and the vestibular mechanism. Afferent impulses from the periphery and efferent impulses from the cerebral cortex pass to this organ for final integration. The cerebellar impulses are then distributed by way of the cerebellospinal systems to the myostatic or posturing mechanism of skeletal muscles.

This, roughly sketched, is my conception of the STATIC system. It is composed of cortico-ponto-cerebellar systems and cerebello-spinal systems which control and regulate the peripheral static mechanism of the muscle fiber. Involvement of this system produces

certain characteristic symptoms indicating a derangement of the posture function.

A disorder of the STATIC system is responsible, I believe, for myotonia, which is the inability to relax muscles after the contraction. There is a more or less persistent state of postural fixation which is not subject to the niceties of neural control and thus interferes with the course of movement itself. Catalepsy and catatonia are also related to the static system and indicate a cerebral disorder of the posture mechanism.

The relationship of the fronto-ponto-cerebellar system to various myotonic phenomena has already been emphasized by Kleist,(10) S. A. K. Wilson and Walshe.(11) The symptomatology of cerebellar disease I would also include in this group, as the cerebellum is the essential ganglionic structure of the static mechanism. All of these symptoms which I have mentioned show a disorder of posture function.

Peripheral Myostatic and Myokinetic Systems.—The distribution of the static system in peripheral nerves and its mode of termination in the muscle fiber is still one of the mooted questions of histology and physiology, although there is strong evidence in favor of the dual innervation of the striated muscle fiber.

The striated muscle fiber is composed of two distinct substances, one subserving a contractile, the other a postural function. The anisotropic disc or sarcostyle is the contractile portion of the muscle fiber and represents the myokinetic mechanism; the sarcoplasm is a more homogeneous substance and represents the postural or myostatic mechanism. In a general way it is estimated that the sarcostyles constitute from one-sixth to one-half of the total muscle mass, the remaining portion of which is sarcoplasm.

Each striated fiber contains a motor nerve ending, which is the terminal of a medullated nerve fiber. For many years this was thought to be the sole innervation of the muscle fiber, until Peroncito (12) and Boeke (13) demonstrated the existence of another smaller nerve ending in the striated muscle fiber, which was the terminal of a nonmedullated nerve.

It is interesting in this connection to mention that clinical researches showed certain differences in the metabolism of muscle which are probably related to these two forms of muscular activity. Pekelharing (14) demonstrated the existence of two chemical processes in muscle metabolism. One is related to the disc system, and involves the utilization of non-nitrogenous substances. The other is

concerned with the albuminates and is probably dependent on the chemical activity of sarcoplasm. Other experiments have shown that the expenditure of energy of the active muscle contraction (tetanus) is far greater than is that of posturing muscle (tonus), which explains the relative unfatigability of the posturing or sarcoplasmic function of muscle.

It is certainly significant that muscle fibers which consist of two distinct types of contractile substance should also present two distinct forms of chemical activity, under different functional conditions.

Furthermore, it has been shown by Langelaan (15) that tonus consists of two components, a contractile tonus referable to the sarco-styles, and a plastic tonus of sarcoplasmic origin.

The plastic component of tonus, according to this view, is controlled by the sympathetic system, while the contractile component is under the control of the motor cell of the anterior horn. Of these two components of tonus, the contractile is the more variable. The plasticity or automatic component is withdrawn from voluntary control and is therefore the more stable factor in muscle tone.

In accordance, therefore, with the conception of the duality of function of the efferent system, which I have outlined, contractile tonus is related to the kinetic system and plastic tonus to the static system. The former is a *kinetotonus* and the latter a *statotonus*, these terms indicating their dependence on the kinetic and static systems for the regulation of their respective functions.

The elaborate studies of Von Uexküll (16) in biology have also contributed very materially to our knowledge of this important problem of muscle physiology. His researches were carried out on vertebrate and invertebrate forms, which included both striated and non-striated muscle. He reached the important conclusion that in the excitation of the muscle fiber we must consider not only contraction but also fixation of the muscle substance. The contraction is indicated by the movement of the muscle mass. The fixation, or, as he terms it, *Sperrung*, is indicated by hardening of the muscle substance.

The general conception of an internal fixation of the muscle fiber during posture as contrasted with its contractile function was formulated by Grützner some years before for involuntary muscle. Von Uexküll confirmed these earlier studies and has shown, in addition, that there are two kinds of internal fixation of the muscle fiber, one he terms maximal fixation and the other gliding fixation (*gleitende sperrung*). Maximal fixation implies the utilization of the whole fixation power of the muscle. It has no gradations and is analogous to the "all or nothing" theory of Bowditch as applied to the con-

tractile function of unstriated muscle. Gliding fixation, on the other hand, signifies the existence of various degrees and gradations of "sperrung," and would correspond to the varying shades and differences of muscular contraction which characterize the higher function of skeletal muscles.

The skeletal muscles of man, therefore, are capable not only of gradations of contractile function, but also of postural function, both of which would be necessary for the performance of the finer and more intricate manifestations of motility.

In this conception of internal fixation, Von Uexküll believes that the sarcoplasmic substance of the muscle fiber is converted into a mechanical posture apparatus by the conversion of sol into gel and a reconversion of gel to sol. This mechanism of fixation would, therefore, require not only clotting but also unclotting of the sarcoplasmic contents of the muscle cell.

Here, then, is striking evidence from the field of biological research of the existence of a myokinetic and a myostatic mechanism subserving respectively motion and posture.

Statesthetic and Kinesthetic Systems.—In the more comprehensive presentation of my theory of the dual nature of the efferent system, the existence of separate afferent systems, both kinesthetic and statesthetic, conveying sensation of movement and sensation of posture, were considered.

It may be stated as a general principle of symptomatology that a disorder of the kinesthetic system produces a loss of the sense of movement, a *kinetic ataxia*; and a disorder of the statesthetic system produces a loss of postural sensibility, a *static ataxia*. The statesthetic system is the sensory component underlying plastic tonus (statotonus), the "lengthening and shortening reactions" of muscles and other manifestations of postural tone. The kinesthetic system, on the other hand, is the sensory component underlying the "twitch" phenomenon and the contractile tonus (kinetotonus) of the muscle fiber.

The vestibular mechanism is also closely related to these afferent components of the proprioceptive system. And it is interesting to note that recent investigators, Magnus and Kleijn (18) and Bárány, (19) recognize the existence of a kinetic as well as a static labyrinth, in which the semicircular canals yield afferent kinetic impulses and the otoliths afferent static impressions which influence the regulation of movement and posture.

The trend of modern investigation appears to indicate that the

labyrinth also has both a statesthetic and a kinesthetic function which are related to the sensory aspects of posture and of motion. Therefore in many different fields of research there are striking evidences of a dual mechanism, in both the nervous system and the muscle fiber, subserving the functions of motion and posture.

I would now consider more especially the cerebellum in its relation to motility.

The Statosynergic Function of the Cerebellum.—In my conception of cerebellar function it is to be regarded as an organ which is engaged in the control and regulation of the static or posture synergies of motility in contrast to kinetic synergy which is under the control of the kinetic system. Static synergy, as I conceive it, is dependent upon the static system which controls the myostatic component of the muscle fiber.

In many respects this theory of the statosynergic function of the cerebellum harmonizes with our modern conception of cerebellar symptomatology. In the coördination of all forms of movement posture coördination is of prime importance. Indeed, all muscular activity is the interplay of kinetic and posture synergy, which are only dissociated by accident or disease. The so-called reciprocal innervation, which is encountered in both the vegetative and cerebrospinal nervous system, is, I believe, essentially a manifestation of the interaction of these mutually coöperative forces in muscle physiology.

Loss of posture synergy is, I believe, the cause of the scanning speech, cerebellar ataxia, intention tremor, hypermetria, adiadokinesis and the nystagmus, which are so characteristic of cerebellar disease. And the fundamental expression of all these symptoms—*asynergia*—is, to my view, dependent solely upon a loss of the coördination of postural fixation in the realm of muscle synergy.

In cerebellar ataxia, for example, a characteristic feature is the decomposition of movement which takes place during the execution of a coördinated act. When this is present it requires several disjointed movements to accomplish what is normally performed as a continuous one. This discontinuity of movement, which is one of the cardinal symptoms of cerebellar disease, I refer to a disorder of posture coördination, which prevents the posture and motion systems from acting together in harmony. The decomposition of movement is therefore a replacement manifestation in the effort to compensate for the disorder of the posturing mechanism.

Hypermetria and dysmetria of cerebellar origin may also be explained by a failure of the posture system in its function of guid-

ing and checking movement. For in any coördinated act *posture formulae* are as necessary as *motion formulae* and play an important rôle in giving stability and direction as well as in checking movement. The checking of movement and its fixation in posture is an essential function of the static system, and is dependent upon the internal fixation mechanism of the muscle fiber.

Adiadokokinesis may likewise be ascribed to a disorder of the static mechanism. The slowing of the quick succession movements which characterize this disorder is also dependent upon a diminution of the finer adjustment of fixation and release of the posture mechanism, which is necessary to the precise performance of such an act.

The cerebellar or intention tremor is a particularly striking example of a disorder of the posture mechanism. When a patient presenting this symptom attempts a movement the extremity passes into coarse ataxic oscillations which increase in intensity as the object is reached and the extremity tends to become fixed in posture. There is a coarse ataxic and tremor-like oscillation not only during the passage of the movement, but also on its termination during attempts at fixation. It is particularly at the end of the movement, when the extremity tends to become fixed in posture, that the intention tremor is often most active. This characteristic of the intention tremor is due to a disorder of posture incoördination and is readily differentiated from other forms of purely kinetic ataxia.

Cerebellar nystagmus may also be mentioned as representing a similar mechanism. Here again the rhythmical movements of the eyeballs tend to increase when the attempt is made to fix an object.

And the same loss of the postural element, also, I believe, underlies such symptoms as the pendular knee jerk and the rebound phenomenon of Stewart and Holmes.

Therefore, while asynergia may be regarded as the fundamental symptom of cerebellar disease, I would limit this conception to a disorder of posture synergy.

As there are archeokinetic, paleokinetic, and neokinetic types of movement, there are also corresponding postural components.

Static asynergia varies with the portion of the static system involved. The recent experimental studies of Magnus and Kleijn(20) have shown the existence of centers for the control of posture function in the spinal cord and brain stem. These centers are concerned with the control of archeostatic synergy.

Paleostatic and neostatic asynergia, on the other hand, are dis-

orders of higher forms of postural synergy, the centers for which are localized in the cerebellum, under the control of corticocerebellar systems.

In the conception of an efferent neuromuscular mechanism one must recognize, therefore, the existence not only of motion but also of posture patterns.

Posture function, however, is continuous, and is engaged in counteracting such forces as gravity and atmospheric pressure.

Motion, on the other hand, is transitory and purposeful, and ceases when its object is attained. In the broader philosophical aspects of the relationship of the organism to reality posture represents a correspondence in *space*, while motion is a correspondence in *time*.

Movement starts from posture, terminates in posture, and is accompanied by posture. For every movement implies also a rapid succession of postures which give strength and stability to movement itself.

It is, therefore, in the posture sphere that the cerebellum plays its important rôle in the regulation of the various posture synergies of motility.

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INTRASPINAL AUTOGENOUS SERUM TREATMENT IN LETHARGIC ENCEPHALITIS

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During 1917, R. D. Moffett¹ suggested intraspinal autoserum treatment in chorea, and based the good results he claimed to have obtained on the supposition that antibodies developed in the blood which overcame the infection in the nervous system.

During 1919, Alan Brown, G. E. Smith, and J. G. Phillips² reported twenty-one cases of chorea treated by intraspinal autoserum in which, although they received previous medical treatment without recovery, recovery occurred in 77 per cent within three weeks after autogenous intraspinal treatment was given.

Fendel,³ in Germany, in 1920, treated lethargic encephalitis by intraspinal injection of autogenous serum and reported improvement from the treatment. Brill,⁴ of Portland, Oregon, in 1920, reported five cases treated with autogenous serum intraspinally with marked improvement in four cases; the fifth case, being practically moribund and complicated with pneumonia, died.

The writer began, independently, in 1919, to treat certain cases of encephalitis by the intraspinal injection of autogenous serum, prepared as follows:

Method of Preparing Autogenous Serum for Intraspinal Use.—Forty c.c. of blood is withdrawn and placed in either two or four sterile centrifuge tubes. This is allowed to clot and is then centrifuged until clear serum is obtained. The serum is then pipetted into another sterile centrifuge tube and recentrifuged at a high rate of speed to get rid of the remaining red cells. This serum is then placed in a sterile test tube and inactivated in a water bath at 56° C. for forty-five minutes to one hour. From 6 to 12 c.c. is injected.

It is sometimes well to use a sensitizing dose of 1 c.c. intra-

¹ Moffett, R. D. Autoserum Treatment for Chorea. Medical Record, 92: 414, September 8, 1917.

² Brown, Alan, Smith, G. E., and Phillips, J. G. Autoserum Treatment of Chorea. British Journal of Children's Diseases, 16:8, January-March, 1919.

³ Fendel. Muenchener Medizinische Wochenschrift, 67:353, March 19, 1920.

⁴ Brill, I. C. Autoserum-therapy (Intraspinal) in Encephalitis Lethargica. Medical Record, 97:1097, June 26, 1920.

dermally before giving the intraspinal injection. When this is done the blood should be taken twice in order that the serum for the treatment will be fresh.

Method of Injection.—A lumbar puncture is made as usual, 20 to 40 c.c. of fluid withdrawn, and a 20 c.c. syringe with a rubber tube and adapter is connected to the lumbar puncture needle. Several cubic centimeters of spinal fluid are allowed to run in the syringe to displace the air and act as a dilutant to the serum, which is now added. The plunger of the syringe is inserted and the fluid injected under gentle pressure.

After completion of the injection, it is well to put the patient in a modified knee-chest position and place several pillows under his abdomen as a support for an hour. The foot of the bed should be elevated for twelve hours.

TABLE OF AUTOGENOUS SERUM SPINAL TREATMENTS

No.	Form of Disease	Complication	Treatments	Result
1.	Encephalitis, acute		3 autogenous	Recovered
2.	Encephalitis, acute		2 autogenous	Recovered
3.	Encephalitis, acute	Pneumonia	1 autogenous	Died in 3 days of pneumonia
4.	Encephalitis, acute	Pregnancy and exophthalmic goiter	1 autogenous	Improved and later died of exoph. goiter
5.	Encephalitis, chronic		2 autogenous	Improved
6.	Encephalitis, chronic	Parkinson's syndrome	1 autogenous	Great improvement
7.	Encephalitis, chronic	Parkinson's syndrome	2 autogenous	Improved
8.	Encephalitis, chronic	Spinal myelitis	2 autogenous	Improved
9.	Encephalitis, chronic	Parkinson's syndrome	1 autogenous	Bad reaction after treatment but great improvement
10.	Encephalitis, chronic		3 autogenous	Great improvement
11.	Encephalitis, chronic	Hysteria and feeble-minded	3 autogenous	Improved
12.	Encephalitis, chronic		1 autogenous	Great improvement
13.	Encephalitis, chronic	Parkinson's syndrome	1 autogenous	Great improvement
14.	Encephalitis, chronic	Parkinson's syndrome	1 autogenous	Great improvement
15.	Encephalitis, chronic	Parkinson's syndrome	4 autogenous	Great improvement
16.	Encephalitis, chronic	Parkinson's syndrome	7 autogenous	Great improvement
17.	Encephalitis, chronic	Parkinson's syndrome	2 autogenous	Great improvement
18.	Encephalitis, chronic	Parkinson's syndrome	6 autogenous	Improvement
19.	Encephalitis, chronic	Chronic choreic syndrome	4 autogenous	Improvement

SUMMARY

In looking over these cases we find that the two uncomplicated acute cases promptly recovered. One acute case, complicated with pregnancy and acute exophthalmic goiter, died in several weeks, although the encephalitis symptoms improved after treatment. Another acute case, complicated with pneumonia, died in three days of pneumonia, and this is the only case in which improvement did not follow treatment.

Of the others, three were uncomplicated chronic cases, nine cases had chronic encephalitis complicated with Parkinson's syndrome, and improvement occurred in all of these cases. One other case of chronic encephalitis was complicated with spinal myelitis and another with hysteria and feeble-mindedness, and still another with chronic chorea; all of these also improved.

By improvement is meant lessening of the lethargy, decrease of the tremors, and diminution of muscular rigidity. We are led to believe, although we have no positive method of estimation, that the eventual course of the disease is favorably influenced. The benefit is probably derived from reaction to the protein of the serum.

In two cases severe, apparently anaphylactic, reactions were noted. This induced us to give intradermally 1 c.c. of the serum before attempting treatments. If the patient is susceptible, reddening from an inch to two inches in diameter will be seen at the point of injection, and there may be a slight increase in temperature and pulse rate. It is wise to give the intradermal test as a routine.

The intraspinal injections may be given as frequent as a few days apart, but it may be best to give them a week apart. We have given as many as seven treatments to a chronic case. We have been using this method from time to time since 1919, and we believe the procedure is safe if the precaution noted, of preceding intradermal injection, is followed.

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NEW STUDIES ON ACROPARESTHESIA AND ITS RELATION TO THE EYE *

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The tremendous number of innervations by the sympathetic nervous systems causes, when irritated, an enormous variety of symptoms manifesting themselves in the so-called vasomotor-trophoneuroses. Although they are met with and recognized as such in our daily practice, their connections with the focus of irritation is of transcendent difficulty. This arises from the fact that the localization of the symptoms and the forms they take are usually quite unrelated to the place of the primary focus and the nature of the irritating factor. Another reason for this difficulty comes from the possible multiplicity of primary causes.

We find, therefore, that the etiologic factors of the vasomotor disturbances have been theoretically exiled to the nebulous lands of diathesis, inherited or acquired, of not correlated general intoxications and diseases and problematic traumata; rarely though has it been possible to lay the finger on a single organ producing through some abnormality the distant phenomena.

From the great variety of vasomotor disturbances I choose as the subject of this essay the limited field of Acroparesthesia.

Under Acroparesthesia we understand the symptom-complex manifesting itself in the most prominent parts of the body, acra, in the form of vasomotor-sensory disturbances of various kinds not based on evident local pathologic changes.

The German savant Von Nothnagel was the first to describe them about the year 1875. He reported seventeen cases who showed mainly the following symptoms: The patients were mostly adult women who suffered from more or less severe local anemia or syncope; connected with the latter were local sensory disturbances, as numbness, anesthesia, and rarely hyperesthesia; pain in the acra was said to be frequent. The course was intermittent and chronic; worse at night and in cold, and practically incurable. He reduced the origin of the affliction mainly to cold.

* Read before the Maimonides Medical Society of Detroit.

The pathology he described as a spasm of the cutaneous arterioles supplying the parts and the etiology as the result of a neuropathic diathesis. The treatment consisted in any measure which helped to dilate the blood vessels.

In 1890, Professor Schultze of Germany was the first to name this symptom-complex Acroparesthesia, and in 1892 he published the same conclusions as Nothnagel, with the important difference that the sensory disturbances, as numbness, anesthesia, and pain, were the primary and preëminent manifestations of the disease, and that the local vasomotor disturbances, as anemia or hyperemia, only rarer and secondary complications. He also taught that the symptom-complex formed a distinct disease entity and based the latter on probable pathologic changes in the local vasoconstrictor nerve endings, or at most in their nearest ganglia. He as well as Nothnagel place the ultimate cause of acroparesthesia in a neurotic diathesis.

In 1912, Cassirer, in his monumental book, gave a résumé of the numerous publications on the acroparesthesias. He found it necessary to subdivide the latter in two groups: The greater "Schultze type," characterized by the absence of local discolorations, and the smaller "Nothnagel type," characterized by the preëminence of the vasomotoric disturbances, *e.g.*, local syncope. He agrees perfectly with their etiologic theories.

Hans Curschmann stated his opinion regarding the etiology as follows: "I assume with Nothnagel that a vascular spasm in the peripheral arteries is always at the basis of the sensory phenomena. In acroparesthesia there develops mostly upon the foundation of a general neuropathic predisposition a peculiar lability and irritability of the peripheral vasoconstrictor nerves. It is probable that in this group of 'vasomotorics' there exist permanent tonic changes in the peripheral arteries. The acroparesthetic attacks then signify the paroxysmal increase of this vasoconstrictor disposition."

Cassirer sums up as follows:

Sex: 83 per cent women, 17 per cent men.

Age: 20-70 years, most frequent between 30-60 years; average age in men 43-45 years, in women 41-45 years. Youngest patient 7 years, the oldest 73 years.

Symptomatology: Unpleasant sensations, mainly numbness, in the hands, rarer in the feet. They feel cold to the touch. No pathologic changes demonstrable, worse at night or morning and cold weather, usually symmetrical. At times in one hand, rarely in single fingers; very rare in the tip of the tongue or the lips.

No disturbance in motility.

Vasomotoric disturbances with acroparesthesias are only 12 per cent of all cases.

Prognosis: Chronic and intermittent.

In the course of my work in the alleviation of eye stresses I had occasion to study the paresthesias as important eyestrain symptoms, and was enabled to show, for the first time, that many paresthesias are directly caused by the local irritation of the ophthalmic division of the sympathetic nerves. The vasomotor-sensory disturbances etiologically and chronologically coincided with the relief or relapse of the eye stresses.

In a series of close to 4,200 cases I saw about 370 patients suffering from the acroparesthesias (somewhat less than 9 per cent of all cases). The sexes were divided in 73 per cent women and 27 per cent men. The average age of men and women were about 37, respective 36 years. The youngest patient I saw was 9 years and the oldest 62.

Of the 370 patients I was able to follow up about 170 cases; 113 (or 65 per cent) reported perfect recovery from their acroparesthesia and 59 (35 per cent) were not improved.

On account of the frequent intermissions in the disease and the danger of being too enthusiastic in recording my results, I counted those who showed only a partial recovery among the total failures.

The cures among the women were 65 per cent and among the men 80 per cent.

As it was easier to judge the results by paying particular attention to the Nothnagel type, as here the local syncope is visible and objective, I decided to present here only short extracts of my twenty-three cases of this type, leaving out all the other eyestrain symptoms.

Case 1. Female, twenty-three years; occupation, fancy sewing. For seven years the first two phalanges of the fourth and fifth fingers of the left hand turned white, cold, and numb. Exposure to cold water did not produce the local syncope. Since wearing glasses (now nearly twenty years) the local syncope never reappeared, though the fingers do feel a little numb occasionally.

Case 2. Female, forty-four years. Last seven years local anemia of left hand. During the attacks the veins of the hand are over-filled and very prominent. No numbness or pain. No report.

Case 3. Female, twenty-nine years; teacher. Since childhood the first two phalanges of the three middle fingers of both hands

turned white and numb on exposure to cold. Her feet felt always cold and were subject to chilblains. She was told that her mother's sister also suffered from "white hands."

Reports: Since wearing her glasses no local syncope or numbness. The feet felt cold only twice and no chilblains developed this year.

Case 4. Male, twenty-seven years; machinist. For the last three years the fingers of both hands get white, numb, and cold in cold weather, but putting the hands in cold water in the summer does not produce these effects. No report.

Case 5. Female, thirty-nine years. The finger tips and the toes get anemic and numb at times. Fears crowded or strange places. Perspiration will cover her body from sheer nervousness before entering even a store.

After two and a half years reported: Perfect recovery from all her symptoms. Fingers and toes remained normal. Lost her phobia.

During the last two months her phobia begins to return, also her local anemia. Needs a re-refraction.

Case 6. Female, forty-one years. During the last three or four years the first phalanges of both hands, except thumbs, turn white and numb in cold weather.

Reports: No numbness; on the day of her report we had zero weather, but both of her hands looked normal.

Case 7. Female, twenty-one years; stenographer. Since she left school to take up office work, three years ago, the hands up to the wrists, *including the thumbs*, turn, almost daily, deadly white, cold, and numb. These attacks last about half a day, relieved only temporarily by rubbing or putting them in hot water.

At other times the hands to the wrists and the feet up to the ankles turn red and hot. On walking barefooted only a minute or two, summer or winter, the feet take on a deep red, but not bluish color. To relieve the heat she places the feet or hands in cold water.

On staying away from the office she feels much better and has no attacks of local syncope or hyperemia.

Reports later: Though working, her hands do not feel numb, but still cold, and her feet hot; hands do not turn any more either deep red or deadly white.

Case 8. Female, thirty-four years. Four or five years ago she noticed the fingers becoming numb when doing a lot of fancy needlework. Two years later the numbness got worse. Last year the first two phalanges of the fingers began to turn white and numb on trying to do any kind of work, especially in the morning.

Reports: Fingers do not turn white any more, though the numbness is only partially improved.

Case 9. Female, twenty-eight years. Numbness of fingers and arms; left arm gets numb nightly.

She began suffering from her "dead fingers" seven years ago, after an attack of diphtheria. During the first six weeks after her diphtheritic attack she suffered about twice a week from blue lips and anemia of the finger. The syncope would recur later on and off with varying severity, but she never went four weeks without an attack.

Fingers of both hands turn white especially in cold weather or placing them in cold water.

Reports: No more numbness nor local syncope.

Case 10. Male, forty-one years; physician. Numbness and occasional syncope of the right middle finger. This last symptom startled the doctor, as he thought of a possible oncoming Raynaud's complex.

Reported some years later that the local anemia never reappeared.

Case 11. Female, twenty-five years. For the last seven or eight years she suffered from local syncope of the index and middle fingers of both hands. In cold weather they turn first pale and then yellowish green. The affected fingers felt numb and anesthetic. A pin could be stuck in the anesthetic area without causing pain. The fingers did never return to normal while in the cold, but would "come to life" in a warm room within a half to one hour.

Reports: Numbness and syncope of the fingers are gone, except the tip of the right index finger, which pales a little in extremely cold weather.

Case 12. Female, forty-five years. Fingers of both hands turn white and numb in cold weather.

Recovered.

Case 13. Female, fifty-nine years. During the last few years the first two phalanges of the third and fifth fingers of the right hand turned numb and anemic. Immersion of the hand in cold water does *not* produce local anemia.

No report.

Case 14. Female, forty-five years. The index and middle fingers of both hands turn white and numb on the slightest chill or on washing them in cold water. This symptom started four years ago, first in the right index finger, then the right middle finger, then the left index finger, and finally the left middle finger. Lately even the right third finger is attacked occasionally. The fingers now take on a greenish hue.

No improvement.

Case 15. Male, fifty-nine years. Right hand turns white occasionally.

No improvement.

Case 16. Female, forty-nine years. Fingers of left hand suffer from local syncope.

No improvement.

Case 17. Female, forty years. Last two years all her finger tips and nails, except of the thumbs, turn white and numb in cold weather.

No report.

Case 18. Female, thirty-nine years. For the last ten years, when she is excited, the hands turn white and numb, mostly so in the winter or in changeable weather. Cannot put her hands in cold water without producing the pallor. While the hands recover from the syncope in about ten minutes, the fingers assume a half contracted position.

No report.

Case 19. Male, twenty-four years; school teacher. Since childhood the fingers of both hands, except the thumbs, turned white and numb on exposure to cold water *only*. The unusual feature about it was that it happened in hot or warm weather, and hardly ever in winter. Later he reported that during the two intervening summers he was not subject to the local syncope, but that at the beginning of the third he noticed a return of his eyestrain symptoms, that a sty developed on the left lower lid, and also that on bathing in the lake his fingers again turned white.

I altered the prescription of his lenses.

Nine months later he reported no relapse.

Case 20. Female, fifty-eight years. Fingers of both hands get at times numb and anemic.

Three years afterwards she reported that she felt perfectly well until lately. Local anemia reappearing. A re-refraction was necessary.

Case 21. Male, seventeen years. The right index finger turns numb and anemic in cold weather.

No report.

Case 22. Female, thirty-eight years. With the beginning of migraine twenty-three years ago she noticed that one day before the attacks the fingers of both hands, except the thumbs, and the toes of her feet got white and numb and the lips dry and blue. The face also turns white, but not numb. The local anemia lasts during the period of the attacks. The migrainous attacks and with them the

local syncope are getting more frequent and severe. The fingers are now subject to local syncope on exposure to cold even without a headache.

Hands and feet feel always cold.

The patient says that she recalls that her father was also subject to severe headache and "dead fingers" and that she often watched them turning white.

The patient reported: Very few and light migraine attacks; no local syncope or numbness; the face did not turn white and the lips remained normal. Hands and feet feel warm.

Case 23. Male, nine years. Hands always cold. On cold days they frequently turn to a deep bluish-red color. His father reports that since childhood his face turns blue on excitement, the weather making no difference.

His glasses made no improvement in the discoloration of his hands or face.

Six of the twenty-three patients were males and seventeen females. Of the nineteen cases that I saw again after prescribing for them correcting glasses, thirteen reported that they were practically cured and six as not at all improved.

In three cases the local symptoms reappeared with the recurrence of other eyestrain symptoms; in one they ceased again with the change of his glasses.

The attacks were never accompanied by pain; they are severer in the winter than in the summer, except in one case where the attacks were precipitated by bathing in cold water in the summer. The fingers, except the thumbs, are usually the seat of the trouble except in one case where both hands, *including the thumbs*, were affected. In the same case the feet and lips were purple and hot, while the hands were white and cold. The same condition also occurred in another case.

In all cases, with the exception of two, numbness accompanied the syncope; only in one case was the numbness intensified to the degree of anesthesia. Cold weather precipitates an attack, but in three cases the syncope was produced by cold air only and *not* by cold water. In two cases the acra turned deep red instead of anemic. In one case the hands were contracted on recovering from the attacks of local anemia.

We have therefore to conclude, Cassirer and other authors notwithstanding, that:

First: Pain is seldom, if ever, a concomitant symptom and that it certainly does not deserve the dignity of being classed as one of the characteristics of the acroparesthesias.

Second: Nothnagel's opinion that cold produces the local anemia is only partially true. In three cases we saw that immersion of the hands in cold water did not cause a local syncope, but cold air did, while in one case bathing in cold water did produce the symptom, while cold winter air did not. We must therefore assume that besides cold there must be another conditioning factor in the production of this phenomenon.

Third: The opinion of Curschmann and others that vasoconstriction is at the base of the sensory phenomena does not seem true of all cases, as we meet cases in whom the local syncope is not at all accompanied by numbness or pain and the very numerous class in whom the numbness is the only symptom present, no local anemia being observable.

Fourth: That Schultze's and Curschmann's suggestions that local pathologic changes are at the bottom of the local symptoms is at best entirely theoretical, as it does not seem reasonable to suppose that one pathologic condition will synchronously produce anemia in the fingers and hyperemia in other parts of the body, or one day anemia and the next day hyperemia in the same part.

Fifth: Showing no demonstrable common local or central pathologic changes, having in common only a rather irritable nervous system, the conception of the acroparesthesias as a distinct disease entity ought to be abandoned, and that we ought to consider them only a symptom-group pointing toward some more or less distant irritating cause or causes.

Sixth: That the prognosis then becomes more favorable, depending upon our ability to discover the original focus or foci of irritation.

I am happy to have been able to demonstrate that the eye with its stresses is *one* of the organs having an undoubted influence in the production of this puzzling symptom-group. What other organs or irritations contribute to the production of the acroparesthesias and other vasomotor neuroses remains to be discovered by future studies of other and more able investigators.

SYNOPSIS

Acroparesthesia was looked upon by Nothnagel, Schultze, Cassirer, Curschmann, and others as a distinct disease entity. No local pathologic changes were demonstrated and no etiologic factors and no positive cure were ever known.

Studying a series of 370 cases of acroparesthesia, I believe to have found that the latter is not a disease entity, but a symptom-group produced by the irritation of the sympathetic nervous systems by some cause or causes. In my cases eyestrain caused or helped to cause the acroparesthesia, and the relief of eyestrain brought about a temporary or permanent cure of this symptom-complex.

I also believe that my cases demonstrated the following facts, that:

First: Pain is seldom, if ever, a concomitant symptom.

Second: Nothnagel's opinion that cold produces the local anemia is only partially true; besides cold, there must be another conditioning factor in the production of this phenomenon.

Third: The opinion of Curschmann and others that vasoconstriction is at the base of the sensory phenomena does not seem true of all cases, as we meet cases in whom the local syncope is not at all accompanied by numbness or pain, and the very numerous class in whom the numbness is the only symptom present, no local anemia being observable.

Fourth: Schultze's and Curschmann's suggestions that local pathologic changes are at the bottom of the local symptoms is at best entirely theoretical.

Fifth: The prognosis becomes more favorable, depending upon our ability to discover the original focus or foci of irritation.

THE APPLICATION OF THE INTERPRETATION OF FORM TO PSYCHOANALYSIS *

BY THE LATE HERMANN RORSCHACH, M.D.

(Continued from p. 248)

The consideration of the manner of apperception leads us a step further. As has already been mentioned in connection with the enumeration, the number of *G* and *Dd* is somewhat too high, and that of the *D* slightly too low. This type of apperception—leaving the succession out of count—means something like this: The subject displays a certain tendency to overlook what is most easily grasped and essential, viz., the *D*, which are always the expression of momentary data. On the other hand, the tendency to *G*, *i.e.*, to generalizing trains of thought, is rather overemphasized. And on the other hand, again, the tendency to lose oneself in trifles, to pick out *Dd*, is also too strong. Thus we are face to face with a contradiction. On the one hand we have the tendency to a search for broad connections, and on the other to almost overnice brooding over accessories. We are thus reminded of the fact that the same contradiction as we meet with here in the sphere of intellectual processes was also encountered in that of the affective ones. In these we found a strong (although somewhat checked) egocentrically impulsive, and a depressively accentuated and anxiously adaptive (although unconsciously dissimulated) tendency. We might at this point continue on the same path and attempt to find further relations between this pair of contradictions and the interpretations from which these parts of the psychogram are derived. The path would be practicable, but it would be a diffuse one. And last, not least, it behooves one to be cautious with such interpretations, and not to stray too far from a given basis, viz., the records and the enumeration. Otherwise there is a danger of deriving too much from single factors and erecting one edifice on top of another.

Let us therefore consider another factor which will give us further indications as to the capacity of adaptation. This is the number of "vulgar" answers—21 per cent in this case—and their distribution.

The vulgar answers represent the share in the collective or common method of sensing anything. Hence, even if we take into

account the fact that there are other interpretations present which approach the vulgar answers, the number will still remain comparatively small. We must therefore predicate that the subject's share in collective modes of sensing is somewhat reduced. We shall connect this small percentage of vulgar answers with the other previously established fact that the subject has not enough *D*, *i.e.*, that his sense of what is easy to grasp seems to be slightly diminished by some necessity, perhaps an obsessional one, of indulging in abstract trains of thought. And, indeed, among his vulgar answers those are above all lacking which deal with *D*. The number of detail interpretations which often recur as vulgar ones is small. We have here another contradiction, *viz.*: Concretely and constructively as the subject interprets, there is lacking a certain simple adroitness of adaptability, the actual smartness of the practical man who grasps and masters a situation with free opportunism—that genuine opportunism of practical adjustment to the matter in hand in the grasp and mastery of the situation.

In contrast to the vulgar answers are the original interpretations, of which our patient possesses as many as he does vulgar answers, *viz.*, 21 per cent. We must lay emphasis on the fact that his originality is genuine. It is not the originality of "talking shop" nor of hair-splitting, but a well-marked peculiarity with an independence of glance which lies as much in the apperception as in the elaboration, and especially in the constructive elaboration of the impressions. Many of these original answers are not only original, but also individual, *i.e.*, such as were given by this patient alone. We shall deal with them later.

The last factors to be mentioned in this connection are the form percentages and the form-color interpretations. With our subject the percentage of properly seen forms is 77 per cent. But if we consider that all the black-and-white interpretations, the *FFb* with (*Fb*), so closely allied with the forms, are sharply apperceived, then we must reckon between 80 and 85 per cent *F* +. Further, it is to be noticed that two of the improperly seen forms which reduce the percentage of the *F* + are anatomical interpretations which, in the case of nonmedical persons, almost always point to an intelligence complex or to hypochondriacal brooding, possibly to both. An *F* + of 80 to 85 per cent is a good average. More than these, nearly or quite 100 per cent sharply picked out forms are obtained among "normal" people only by the pronounced "nagger" and pedant who is bent on being absolutely unbiased, but who for this reason has never more than two or three "whole" answers, sees only *D* and *Dd*, and does

not venture on constructive and combinatory trains of thought. Our subject, in spite of his partially anxiously cautious will to adapt himself to circumstances, is far removed from this type.

The *FFb* are those interpretations which represent the actual affective capacity of relation and adaptation, a kind of combination of affective and intellectual adaptability. In general, they are the characteristic of healthy persons who are well adapted and capable of adaptation. Our subject has only one form-color interpretation, and this is a questionable one; it might be a color-form or a mere form interpretation. Here, indeed, is the gap in the patient's emotional life: on the one hand the expansively egocentric affectivity and on the other the too consciously careful adaptation represented by the chiaroscuro interpretations. His capacity of application and his will towards this end are beyond all doubt. As my colleague, Dr. Oberholzer, testifies, he proved this to a high degree during the experiment.

Before we proceed further with our investigations let us at this point briefly recapitulate what the interpretation of the experimental records has told us up to now: Neurosis with an introversive type of psychic reaction; hence predomination of psychasthenic coloring, probably with obsessional phenomena. In the affectivity there is a deficiency of freedom in the adaptation, and a contradiction between two tendencies, one of which corresponds with a depressively accentuated and all too conscious, all too intellectual manner of adaptation, and the other with an expansively egocentric affect life. The intelligence is on the whole good, quick, and original, more concrete than abstract, more inductive than deductive. But there is likewise a contradiction in the intellectual sphere, a relative weakness of the sense of what is practical and to hand. Here, therefore, we have also a kind of gap—on the one hand a probably obsessive impulse to abstractive and generalizing trains of thought, and on the other a tendency to start its constructions from some complex-like chosen central point instead of from what is practical and essential. The subject thus easily falls a prey to details and accessories, and loses himself in these. But there is no incoherence; the subject is both affectively and intellectually disciplined and accustomed to master himself.

The remaining factors of the experimental records which we have not yet estimated are the three space-forms. Space-forms always signify a kind of spirit of opposition. If the type of psychic reaction is extratensive we have a spirit of opposition towards the external world, defiance, a tendency to polemics, to contradiction and aggres-

sive caprice. But if the type of reaction is ambiequivalent the spirit of opposition is directed against the subject's own consciousness, and scepticism, doubt, hesitancy, indecision, as well as affective ambivalence and ambitendencies, and not infrequently obsessional "thoroughness" and completeness of every kind, a mania for collecting, are connoted. If the type is introversive the space-forms appear to signify opposition to the subject's own most inner life, resulting in constant distrust of himself, feelings of insufficiency of every kind, scrupulousness and precision, very often a mixture of phlegma and asceticism.

Our patient is a pronounced introversive type of psychic reaction which, however, is closely allied to ambiequivalence. The ideas of insufficiency will therefore predominate, particularly those which are directed towards the inmost *ego*, let us say, the productive sphere—distrust of himself and his efficiency and capacity. But we shall likewise look for the phenomena which correspond to the ambiequivalent type, for there are, as we know, in our patient's case, both introversive and extratensive repressed factors, and the actual direction of the constriction or coarctation always tends towards ambivalence. Hence both scepticism and doubt, as well as ambivalence, will be found simultaneously, and we may suppose that both—the spirit of opposition towards the inner self and that towards the conscious—combine and give the following result: Fretting and doubt with regard to his own intelligence, hesitancy and difficulty of decision, insufficiency phantasies and obsessional overcorrections up to ascetic traits, obsessive thoroughness, the mania and necessity of looking at things from all sides, of not neglecting the reverse side of the medal, spasmodic and pedantic clinging to absolute objectivity. By this the neurotic share is with one stroke much more clearly indicated than hitherto, and it is striking how the study of the space-forms brings the neurotic aspects of the records into startling prominence. This is very often the case, and the space-forms frequently give such clues. Probably the other factors also contain numerous clues which can only be found by increasing experience.

But here the space-forms have something of their own, and bear, in this case, individual features. They are utilized for black-and-white interpretations, at least two of them are, and in quite a similar manner. I refer to the two paths with their perspective distances in Pictures II and X. Quite different relations result thereby. If we start from the consideration of the space-forms we obtain ideas of insufficiency, but if we set out from the other half of the formula— $Dz w F(Fb)$ —the chiaroscuro interpretations—we arrive at the

cautiously adapted and consciously guarded affective amount of which mention has already been made: hence the insufficiency ideas and their correction on the one hand, and the cautiously guarded affect amount on the other will inevitably stand in very close relation to each other. But then we shall have to presuppose that each of the two factors exhibits a relation to the contents of these interpretations. As far as I have been able to see in similar cases, this is actually the fact. Those who give striking chiaroscuro interpretations have important complex features hidden in the contents of these interpretations, in the form of corrections, in the shape of wish-fulfilments, so to speak. Here we have landscapes, or rather architectural landscapes; with others they are castles and towers, temples and archways, etc. When we meet with such interpretations we can certainly infer that the subject feels himself inwardly decayed, impotent, out of joint and inharmonious, and that he projects these feelings in the shape of wish-fulfilments into the built, *i.e.*, interpreted edifices and streets, temples and archways. The insufficiency emotions of the subject's own "bad building" which are betrayed in the case of introversion in the space-forms, and the unfree depressively-careful affect amount announced in the black-and-white interpretations, seem to be the unconscious basis for the interpreted buildings, which represent the corrective output.

Finally, these interpretations possess another remarkable feature. Of all the interpretations, these chiaroscuro ones are those which most emphasize the depth dimensions of the picture. Our subject, too, accentuates the perspective distance, and his other interpretations of this kind also indicate his threefold dimensionality. According to my experience it would seem that a peculiar psychic correlation is here at work. A special gift for the apprehension of space, depth, and distance appears to be correlated to an affectivity of a somewhat anxiously and cautiously guarded, and in some way depressively toned character; very often—perhaps always—to certain feelings of insufficiency, the content of which is a feeling of instability and out-of-jointedness. Such black-and-white interpretations therefore as name architectural pictures and are original or almost original answers, lead us to infer with a fair amount of certitude the existence of a strong capacity of perceiving space and constructive talent. I did so in this case, and turned out to be right, although I knew nothing of the patient's profession, and none of his interpretations betrayed him by their manifest content. The record of the analysis handed to me later by my friend Dr. Oberholzer contains a number of remarks on the "formal" side of the subject's psychic personality

which confirm his constructive gifts and his strongly developed sense of space. He had more than once given evidence of these with creative inspiration in his work as engine-builder, and if he is shown a projected construction he can say beforehand by mere mental perception, *i.e.*, before any drawings have been made, whether it can be carried out on paper or not. Building plans become living to him and furnish him with a plastic image of the finished work, whereas he himself is unable to conceive an original or new form.

We have already met with this constructive ability in the *G* interpretations, which often prove themselves to be constructed out of detail apperceptions. No conclusion, however, as to technical constructive talent can be drawn from these constructive "whole" interpretations alone, but only as to the manner in which the subject draws his intellectual inference. Those who interpret constructive *G* will build up their conclusions from some detail or other, and will be inclined to model their conclusions on the detail apperceived at the commencement; they will create surprising conceptions, and sometimes, however, fall into an excessively idealizing modelling of their conceptions. If there is a clever intuition at their service they will survey broad connections in the manner of great organizers with fabulous sureness, but on the other hand they will be one-sided almost to blindness in their constructions and treat all things alike if the intuition fails. But if we can establish the technical constructive gifts as we have done here with our subject, and if he has at the same time a number of carefully weighed constructive "whole" apperceptions, then we may say that these two groups of psychism—the constructive thinking and the actual technical constructive talent—can be combined to a high power of efficiency.

I have just mentioned intuition. When a subject cleverly interprets *G*, and these arise with particular rapidity and mingle abstract and constructive, as well as combinatory association processes promiscuously, then intuitive capacities may be inferred with certainty. In our record, in my opinion, intuition is most closely implied in the fire and smoke interpretation of Picture II. The constructive part outweighs the other, it is true, but the apperception of this interpretation appears to be the work of a *single* glance. With regard to such intuitive interpretations it is seen that they are rich in complex-relations. On the other hand, intuitive interpretations are given only by people who have a "dilated" type of psychic reaction, *i.e.*, who produce many kinesthetic and color answers. The fewer *B* and *Fb* the rarer are the intuitive interpretations. For this reason neurotic repressions leading to a coarctation of the type of psychic reaction

finally throttle intuition. However, not every intuition is a valuable one. In order to be of value, not only the faculty of dilatation, but also that of constriction is necessary, for the form arises only in the conscious elaboration of those psychic spheres whose function is the sharp, self-watching apperception of form, in the mediatory organ between introversion and extratension. Only then, when the capacity of rapidly apperceiving and capturing the intuition gained in the dilated type of psychic reaction as a whole form, *i.e.*, of proceeding quickly from the dilated to the constricted type, is given, only then, I say, can the intuition be a valuable one. Its value is consequently jeopardized in two cases: when the capacity of constriction is too weak, or when the habitual constriction is too strong. If the capacity of constriction is too weak the intuition remains sketchy—an aphorism, a castle in the air, a Utopia incapable of practical execution. But if the constriction is habitually too strong, *i.e.*, when the *ratio* alone predominates, or when it has become too strong as a result of neurotic repression, then the intuition is paralyzed. This last is the case with our subject, whose neurosis paralyzes the liberty of his inner production, as so often happens. Naturally, this is nothing new. The only new thing is that here, for instance, throughout the whole experiment we can follow the evidence of the patient's antagonism between the repressing conscious and the repressed unconscious, the constriction of the productive sphere owing to neurotic repression, and the complete stifling of inner liberty by the conscious corrections and obsessional superstructures. In this way we can understand the wholly inadequate manner in which our patient first plunges into abstract trains of thought and allows himself to be guided by complex-like adjustments, instead of following his own adequate constructive disposition. We are thus dealing with obsessional phenomena arising out of depressive feelings of insufficiency.

And finally, a correction. Hitherto we have paid too much consideration to the introversiveness of the patient, and too little to his extratensiveness. The fact that the patient's immediate interpretation of the first, partially-colored picture (II) is an almost intuitive color-form interpretation shows that a purely numerical estimate undervalues his extratensive factors. The introversive ones certainly predominate, but the extratensive ones are not so weak as might at first sight appear, and we may infer with certainty that from time to time, at least, displacements of the type of psychic reaction towards extratensiveness are possible. If our patient has had extratensive periods of a fairly long duration, or if these still occur, his psychogram, and with it his diagnosis, must undergo some alter-

ations. At periods of extratension the subject will necessarily be capable of defiance and revolt towards the external world, to impulsive action and aggressive adjustments, and at such times the quality of his neurosis will be changed by the hysterical conversion phenomena which appear in place of the psychasthenic symptoms; the obsessional phenomena will assume another character, and there will be obsessive acts and feelings, possibly obsessional movements.

All the same, the whole soul-picture will obtain a certain stability by the fact that in spite of the strong application volition, the introversive and at the same time somewhat autistic *habitus* towards the external world will not be so easily broken through. As a rule the patient will be the psychasthenic who is always angry with himself, dissatisfied with his output and who easily capsizes, only to pull himself together again, thanks to his need of application, but who does not find a perfectly free affective relation with the surrounding world, and has a fairly strong tendency to go his own way. The predominating temper, the habitual affect situation, will be a somewhat anxiously depressive and slightly passively resigned one. But mastery over this will be obtained as far as mastery is possible, thanks to the good intellectual capacity for adaptation.

3. RECORD AND PSYCHOANALYSIS

All that now follows refers to the theme actually in hand, viz., the relations between the experimental record and psychoanalysis. This is best surveyed by the aid of a schedule in which the interpretations of our patient are arranged as follows:

The upper middle column contains the interpretations which are pure form-answers (*F*); the upper left column gives the interpretations that might possibly have kinesthetic determinants (*F* tending to *B*) and the lower left column contains the kinesthetically determined answers (*B*). The top right hand column is that of the chiaroscuro answers, the form-interpretations tending to color-interpretations, the *F(Fb)*; the column just below this gives the form-color answers; the one below it the color-form interpretations, and the lowest of all contains the pure color-answers. *V* stands for the "vulgar," *O* for the original interpretations; the italicized replies are the individual answers.

This grouping conforms closely to the schedule which I have been using for a long time and which is constantly recurring in my "Psycho-Diagnostic." The middle represents the conscious functions (the *F* percentage is an indication of the sharpness of the association processes and at the same time of the perseverance of the

attention, as well as of the capacity of concentration), the left half represents the introversive factors, and the right half the extratensive ones. Their proportions, the proportion of *B* to *FbF* and *Fb*, allow of certain self-evident inferences with regard to the extent or the vivacity of the autistic trains of thought. The sharpness of the forms and the orderliness of the arrangement, of the succession, leads to conclusions touching the counterweight, *i.e.*, the extent and efficiency of disciplined thinking. If we apply the notions of conscious and unconscious as understood in psychoanalysis to these experimental factors, then, in view of their symptomatic values, it is obvious that the *B* interpretations, as well as the *Fb* and *FbF* answers, stand closer to the unconscious than do the form interpretations, and that the individual and original answers—in so far as we are dealing with genuine originality and not with “shop”—tell us more of the individual endeavors of a subject and consequently betray what is psychoanalytically significant more than do the vulgar answers.

F tending to *B*
A skeleton with a light wrapping.
A flying being.
Bears or dogs with thick-set bodies and short legs, their tails hanging down into the lower part. *V*.
Two little animals with feelers, as if standing on their hind legs.
A squirrel, as if coming after; sitting on the branches. *O*.
Two dogs, barking, and looking as if they are watching the house.

B
Two clowns. *V*.
Two dudes greeting each other according to approved etiquette. *V*.
Two human bodies in a bowed attitude, their legs hanging down. *O*.
Dwarf grasping the red and making a step *O*.

F
Bat. *V*.
Skeleton.
Symmetrical body with pronounced medial axis.
Beast of prey's skin with pronounced backbone. *V*.
Spread-out insect.
Pelvis (basin).
Gargoyles like rodents. *V*.
Humanlike gargoyle. *V*.
Dorsal column.
Animal heads.
Polypi.
Newts.
Arm of the sea.
Gargoyle with long pig-tail.

Abstractions.
As if the red thing in the middle were a force that separates the two men or prevents them from meeting.
On the whole the impression of power in the middle, to which everything clings.
The white line in the middle, the line of power around which everything is arranged.

F tending to *Fb*
Park road surrounded by fine dark trees, which loses itself in the distance; in a balustrade: the whole quite perspective.
A column of smoke springing up sharply in the center and dividing and spreading to lose itself within above. *O*.
Smoke clouds and formations.
Fountain-like ascent from the middle branch.
Norwegian coast and Sweden. *O*.
Park road, the darkness, the trees, and in the middle the path stretching a long way *O*.
Steep coast.

FFb
Colored collection of beetles.

FbF
Source of fire developing smoke that spreads to the top, whence flames break out again.

Fb
Fire.

In the case in hand it cannot be mere chance that the most original *B* interpretation should be two bowed human beings, and the most original color interpretation such a peculiarly constructed, almost, we might say, intuitive picture of fire with thick smoke and flames breaking out. The bowed humans must stand in a certain relation to the introversive contents, and the fire picture to the affect accentuations of the subject and, indeed, without his being conscious of it, for he could not notice whether he gives *B*, *F*, or *Fb* interpretations. And finally, as I have already hinted in my psychogram, the highly striking and absolutely individual abstract answers incapable of formulation which are noted in the above group in the middle column below the form answers must have an unconscious background, however rationalized they appear to be. If, therefore, any interpretation in the experiment betrays a complex-content, we shall look for this in the first place in the original and individual answers, which are at the same time *B* or *Fb* interpretations, seeing that in these interpretations there are relations between what is formal and what belongs to the content.

The presumption for the existence of such relations was first demonstrated in the case of the *B* interpretations. Of course the interpreted object is not so important in itself, any more than in the interpretation of dreams the manifest content, the dream itself, is of decisive importance, but rather the definite kind of kinesthesia. It was observed that subjects who see more extensor kinesthesia, *i.e.*, stretched and moving figures, are essentially different from those who mostly see bent and bowed, burdened and twisted, kneeling and recumbent figures. The former are active persons, people with strong impulses towards importance and activity, if often with neurotic inhibitions; the latter are of a passive and resigned nature (Psycho-Diagnostic, p. 18). Thus in Picture V (with the picture placed at a narrow angle) a representative of the former group saw a female dancer leaping upwards with passionate movements; a representative of the second group saw an old woman with two umbrellas under her arm. The experimental record of a politician which recently came under my observation had as the only kinesthetic interpretation two gigantic idols clinging to something. Combined with these there were several original color answers which always repeated the same theme: interior of the earth, of a volcano, the core of the earth, and the like. At the same time—as with our subject—there were some abstract interpretations to which, above all, the center line and the part of the picture lying in the middle gave him the impetus and which, again, are variations of a certain theme: the germ out of which

everything is to be developed. Hence on the one hand we have gigantic idols, and on the other the interior of the earth and the germ out of which one develops everything, interpretations which lead us at least to suspect that there are world-creative phantasies present, and which betray how the man came to be a politician, particularly a constructive organizer. Such experiences have likewise demonstrated that the contents of the interpretations given to the experiment can be of some importance, and this, especially, owing to the relations existing between form and content.

Let us return to our patient, who was analyzed by Dr. Oberholzer, and see what was demonstrated by the help of psychoanalytical facts and the results of the analysis.

a. THE *B* INTERPRETATIONS

Formally, the *B* interpretations are the representatives of introversion, of interiority. The more the kinesthetic interpretations predominate over the color-interpretations, the more introversive is the subject and the greater is the part played in his psychic life by the introversive mechanism, with a tendency to regressions and reactive conduct towards the world.

In our case we have a distinct predomination of the flector kinesthesia, and among them are the curiously bowed human beings seen in Picture IV, the most original of all the *B* interpretations. The result of the whole record is confirmed by the special kind of *B* interpretations. The subject is not only introversive, but in this introversion flector-kinesthesia play a part. There must be an unconscious passive adjustment present. So far do we approach the unconscious from the experiment. If, like my colleague, Dr. Oberholzer, we pass, on the contrary, from the analysis to the record, the result is as he states:

"The flector-kinesthesia indicate the patient's profoundest adjustment to psychic experience (*Erlebniseinstellung*). They are the expression of his passiveness and of the feminine part of his sexuality. This passivity arose from original sadistic instincts on the way of a very early bent towards his own person,¹¹ and was later combined with the sexual instincts to a feminine adjustment. The original sadism is found not only in cruelty traits in his dreams, but it broke out earlier and later in life in occasional outbursts of temper during which he would strike out blindly and could not understand his passion afterwards; further in occasional want of consideration, bordering on brutality, in the pursuit of business aims and interests.

¹¹ Freud. Triebe u. Tribschicksale. Zeitschr. f. Psa., 1915.

or in sudden outbursts against his subordinates, when the master-nature announced itself for a moment, in violent contrast to his conscious revolt against crude instincts and his habitual mastery of himself. A part which was not mastered on the way from the transition into passivity and masochistic sufferance gave rise in the pre-puberty period, after having been manifested in early childhood by mastery phantasies, to an initial obsessional neurosis in the shape of pronounced obsessional thought. This initial obsessional neurosis marked the later obsessive character of the patient, who attempted to regulate the elementary instinctive functions.

The *B* series is therefore what is lived (*gelebt*). I purposely refrain from saying what is experienced (*erlebt*), so as not to create the impression that the patient knew of the nature of these experiences. *B* is the all-compelling: what is lived and how it is lived. The patient sacrificed eight years of his life in the attempt to save his father's firm, only to succumb in a struggle which was, indeed, a vain one from the outset—a struggle against unfavorable circumstances and the brutal egotism of his own brothers, one of whom, remarkable for his fine strong teeth, regularly appeared in his dreams as a father-substitute. Our patient supported all this in memory of his father, for his father's sake, "for love of his father." After the inevitable liquidation of the business, which put an end to these eight years of suffering, during which the patient had experienced nothing but bitter disappointment in his devoted self-sacrifice, the neurosis broke out which continued the "hammer blows" of those years.

Hence the flexor kinesthesia belong to the deepest unconscious, and their content can hardly be called a mere content. In consideration of and in connection with the symptomatic value of the factors, this almost certain proof is surely remarkable. In a theoretical foundation of the experimental results the relation of the kinesthesia to the unconscious would have to be allowed for first of all."

The kinesthesia, which have here become the determinants of interpretation, bring in fact unconscious matters to the light of day, for the analysis confirms the fact that they must stand in the very closest relation to that which we are accustomed to call the unconscious. The passive nature of the patient demonstrated by the analysis explains from within the other traits named in the psychogram during the interpretations, viz., the asceticism in the psychic experience of the patient, his feelings of insufficiency, his distrust of himself, particularly with regard to his own productivity, and at the same time explains to a certain extent whence the contradictions in his whole being are derived.

b. THE *Fb* INTERPRETATIONS

In my "Psycho-Diagnostic" I was able to show that color interpretations, especially *Fb* and *FbF*, must have something to do with the affects of an egocentric nature, with undiluted, almost instinctive affectivity. On the other hand, the contents and their relations to the formal remained obscure for a long time, however self-evident it was that the contents could not be independent of the concomitant *nuance* of affectivity. If anybody gives a whole series of correct *Fb* interpretations, *i.e.*, representatives of impulsive affects, and if fire and blood constantly recur as contents of these interpretations, we must suppose that in the patient's psyche strong affects have something to do with fire and blood, and fire and blood with strong affects. There will further be a difference whether the subject interprets the red spot of a picture as an open wound, or whether he sees rose-leaves or syrup or perhaps a slice of ham in it. But the question as to how far the contents of such interpretations belong to the conscious and how far they belong to the unconscious could not be decided till we met with at least one suitable case. A case of this kind is that of the politician, the world-builder already mentioned. He always interpreted the core of the earth, chaos, the interior of the earth, as *Fb*, and on the kinesthetic side the gigantic idols. Our inference therefrom was: He himself desires to create the world anew. And yet this is merely a manifest content; the latent content tells us something else. The gigantic idols are in a remarkable situation, for the kinesthesia indicate the picture of the fetal position. The core and the interior of the earth might therefore signify something quite different, *e.g.*, perhaps the mother's womb. This implies that the color answers penetrate far deeper into the complex than would at first appear, and that the egocentric affectivity really has its source in the most highly stressed affective psychism. The contents of the color interpretations would therefore have to be valued somewhat as the manifest dream content, as compared with the latent one, which is only developed from the former by the dream analysis.

How does the question appear when we look for a solution in the analysis? I again quote Dr. Oberholzer:

"Smoke and fire form part of the childhood of our patient, and with the forge which was then a part of the paternal house there are connected important infantile memories about his father, who was a master in the art of tempering, a special technical process to which he owed his reputation, a fact which soon became known to our subject. Although hardly capable of climbing the staircase, the child would constantly slip into the workshop, or, if he were shut out,

would look longingly in for hours at a time, regardless of wind and weather. The workshop, as well as the large factory that grew out of it later on, with its machinery and machine parts, belongs to the most frequent manifest dream elements. As a sexual symbol they have given him the most important media of representation, from which, among others in the course of the analysis, conclusions could be drawn regarding his early infantile curiosity towards his parents, as well as the feminine adjustment to his father. In one of those dreams he was the spectator of a big boiler being brought into the foundation under the scaffolding; in another he saw cast-iron standards being let into round concrete holes.

"Hence the color interpretations are a part of the symbolic material through which the analysis has to work, the symbolic value and relations of which were unknown to the patient. It may be expected that, with an increasing number of *Fb* answers a correspondingly larger part of the symbolic material could be elicited."

Here again we have the proof furnished by the analysis, and we shall, in the analysis of the dreams, when factors appear that remind one of the contents of the color interpretations, then be able to attribute a special importance and a special central position to these motives.

C. THE ABSTRACT INTERPRETATIONS

The abstract interpretations are not precisely form interpretations, but rather the interpretation proceeds from the middle position and center line of the picture. No form-apperception with a visual memory picture is discovered, as in the other interpretations, but rather a description of the impression which the center line produces in its relations to the surroundings. The most pronounced descriptive interpretation that our subject gave and which it most closely related to the abstract interpretations in question, is that standing above in the column referring to these. Such descriptions are always the expression of repression phenomena, and utterances of revolt. Very similar are the purely abstract interpretations, although at the same time they betray a strongly affect-laden application to the task in hand.

Let us take a survey of the interpretations built up on the central line:

First (Pict. I) a skeleton, then a skeleton in a wrapping. The interpretation of bones and skeletons, etc., is chiefly found in neurotics who complain of inner emptiness, dreariness, and coldness; and wrappings, envelopes, and masquerades very frequently betray a tendency to disguise. Depressive feelings of emptiness and want

of harmony with oneself, together with the tendency to hide this depressive feature, have already been met with in our subject, namely, in the chiaroscuro interpretations. A chiaroscuro interpretation of this kind is the aforementioned wrapped-up skeleton. Thus in the first picture the middle line is more strongly accentuated with affective poverty, with a suspicion of disguise and dissimulation in the affective behavior in question.

In the second picture the interpretation suggested by the middle line is a landscape seen in perspective, *i.e.*, once more a chiaroscuro interpretation, but this time, so to speak, a positive and constructive one. We are probably right in stating that the interpretation sublimates the respective affect amount in the execution. There follows, however, in the same picture the interpretation of a spring of fire, a *Fb* interpretation which comes out almost with the force of an intuition.

In the third picture the abstractions begin. The force which separates the two figures and prevents their meeting, and the mention of two motor notions, a centripetal and a centrifugal one, illustrates at the same time the ambivalence of the central line. In the fourth picture again a cloud of smoke, and then the impression of the power in the middle on which everything hangs. In the fifth there is a half-descriptive interpretation—a symmetrical body. In the sixth we have a purely descriptive one—the symmetrical figure with the strongly-marked medial axis around which everything is ranged, and then, again, an abstract interpretation, *viz.*, the white line in the middle, the line of power around which everything revolves. In the seventh picture we have again fire and smoke, preceded by a skeleton part, and the stress laid on the central line. In the eighth again a skeleton; in the ninth a geographical interpretation belonging formally to the chiaroscuro interpretations, and a half-descriptive one, *i.e.*, the fountain-like figure rising from the middle branch. In the tenth we have once more the park road; another chiaroscuro interpretation. It is only at the end that some harmless interpretations follow, but finally the middle is once more brought into prominence and interpreted as a passage protected by two barking dogs.

Hence we find, attached to the middle line, interpretations of the most varied formal conditionality; descriptive and abstract interpretations, and, further, both the most concentrated and the most diluted color-answers, the *FbF* and the *F(Fb)*, the chiaroscuro interpretations. These demonstrate the two affective fundamental dispositions of the subject, the depressively adapted and the egocentric ones, chiefly attached to the center line, the former by the skeleton parts

and the park roads, and the latter by the fire column, *i.e.*, elicited by their content. In addition, the ambivalence of the middle line is demonstrated by the *double entendre* of the motor answer to Picture III. In the interpretations of the middle line, to which the *G*, particularly the constructive ones, belong, we meet, too, with a tendency towards space-forms and *Dd* interpretations, the unusual small details, to which (and the *G*) the middle factors of the type of apperception, the normal *D*, yield, in agreement with the lack of the mean values of the affectivity, the *FFb*, the free affective exchange with the surrounding world. In the middle line, therefore, all the complex-like activities are summarized, and all the contradictions knotted together: the greatest affective force expressed by *FbF*, the most intense constriction and affect-repression, the purely descriptive interpretations, all meet together—an apparently inextricable mixture of alternatives and contrasts, the solution of which most probably lies in the *abstracts*, the most striking and individual interpretations.

In these abstract interpretations the question is always cropping up of a relation of the middle line to the lateral surroundings: the middle line to which everything is attached. If we imagine this attachment as kinesthetically caused, the question arises whether the middle line which attracts the attention of the subject with almost magical power attaches itself actively to the surroundings, or whether the lateral parts attach themselves actively to the middle line. A solution is rendered possible by the fact that not one of the kinesthetic interpretations falls to the center line; the genuine kinesthesiae, the clowns, the dudes, the dwarfs, who are grasping the red, all refer to lateral parts of the pictures and exhibit movements directed towards the middle line. This implies that the subject senses the lateral parts as the clinging or attached portions, and the wording of the abstract interpretation is in accordance: The force in the middle to which everything is attached, the line of power around which everything is arranged, the middle axis around which everything revolves. If movements are sensed here, then it is obviously not the center line which clings actively to the surroundings, but the surroundings which cling actively to the middle line, striving towards it and holding fast to it. The center line is the abstract magic power which gives a hold. The whole deduction then repeats things already contained in the psychogram, *viz.*, that the subject suffers from a comparative incapacity to obtain a hold and a center-point, that his adjustment is passive, and that the active central force, the active central power, is missing.

This is the result obtained from the experiment. In order to

make everything perfectly clear the result of the analysis must help us on the way, and it does so with startling significance. Dr. Oberholzer writes as follows about the abstract interpretations:

"In these interpretations everything turns upon force, central line of force, central point of power. The same is found in the analysis. The central point—in the dream symbols as well—was the subject's father, and his father was the force. In one of these dreams his father, after whose death the patient had vainly attempted to prevent the ruin of the paternal inheritance, was symbolized by the queen ant who keeps the ant state together and, in the dream, stung the patient in the finger. In another dream he thought that he awoke in the night and followed the movements of the celestial bodies, which he designed by a curve passing through a central point. The dream associations led back to the first period of insomnia which arose before the outbreak of the previously mentioned obsessional phenomena, after having witnessed the performance of a couple of rope-walkers. Later on these associations led him further back to a time when, as a little boy of three to four years old, he had often desired to see his father's genitals, and at night often woke out of his sleep in a state of anxiety. In the analysis he always gave "force" the epithet of "thickset," so that I was able to say on the nail that his father had been a thickset man."

In this connection I should like to refer to the first interpretation of the first colored picture (VIII). The subject interpreted the red side figure as a category of animals, bears or dogs, which he designated as "thickset in body and with short legs." After what we have just read it is scarcely possible that this is mere hazard, especially as we are dealing with a red part of the picture.

Without knowing anything about my above deduction about the abstracta, Dr. Oberholzer continues:

"In the abstract answers the *B* and *Fb* series run concurrently. Their content—there is always only one and the same, viz., power or force—expresses of what kind are the symbolic relations contained in the color interpretations, but unknown to the patient. It is that which he would like to 'live,' in the last instance the desire to experience the power of the paternal genitals, a wish-fulfilment that was the subject of many dreams both before and during the analysis.

"Hence in the abstract answers profoundly introversive and affectively accentuated contents are concurrent, and the flexor kinesthesia and the abstract interpretations fit each other like lock and key. The endeavor of the kinesthesia to 'live' the contents of the abstract answers is the deepest source of the longing which possesses the

patient, of his anxious depressive fundamental disposition, his habitual affect situation. From this source springs all that we find in the psychogram—feelings of insufficiency, want of harmony with himself, the longing for rest, for a firm hold and for unity.”

The experiment has thus shown of itself that the power or force of which the abstract interpretations are constantly speaking are something longed for, overlaid with the deepest affects and, so to speak, the goal of the kinesthesia. Further, that the adjustment to this force is a passive one, and that the unconscious seeks a hold in this power, that this power actually exercises a kind of magic influence through the unconscious affect occupation and signifies a center of life for the patient, but that at the same time he does not desire to possess them actively in the deepest unconscious, but desires to suffer them passively. The analysis had therefore only to insert the real object, and can thus say with certainty: This power is the father. With this key many passages are rendered accessible with one stroke, the most unconscious adjustments are perceived, and the discovery of such a pregnant fundamental adjustment is probably at the same time a prognosis for the analysis. If the force likewise signifies the analyst, then the transference must work miracles.

This was actually the case. As my colleague, Dr. Oberholzer, told me, the hysterical symptoms, the presence of which can be read from the experimental records, and which actually occurred from time to time only, namely, periodically, in the form of most violent attacks of giddiness which led to falls, and were accompanied at their height by vomiting and profuse diarrhoea and with complete deafness of the left ear—these paroxysms ceased after the first sittings for treatment, and appeared for the last time with a serious attack only when, at a later phase of the analysis, the growth of the transference out of the deep unconscious fundamental adjustment was under consideration. The patient had been paying his tribute to this fundamental disposition by the attacks of giddiness and the deafness in his left ear since the liquidation of his father's business. As is so often the case, the left side had shown itself to be the feminine one, and the fact so long withheld by the patient from the associative connection, that his mother, as far back as he could remember, was deaf in her left ear, demonstrated the share of identification with the mother in the formation of the symptoms.

d. THE FORM-INTERPRETATIONS

There still remain the form interpretations, and these, as far as Dr. Oberholzer is able to gather by the analytic material, exhibit no

important and distinct complex relations. This is theoretically quite plausible, for form-interpretations, the purer they are, the more certainly are they the work of the conscious, and the share of the unconscious in these is infinitely smaller than in the kinesthetic and color-interpretations. But in practice this is not always the case. There are neurotics who exhibit complex relations in their form-interpretations as well. It is true that the complex usually appears not unchanged, but overwrought, as, *e.g.*, the towers which the politician had in his form-answers, and which are probably projected narcissistic wish-phantasies. But there are also subjects in whom distinct complex features are revealed in the *F* series. These are the irrational types in whom unconscious material is constantly percolating into the conscious, and further, those subjects who are in a pronounced good humor at the time of the experiment, for good humor dilates the type of psychic reaction and allows otherwise repressed material to get smuggled into the conscious. The stronger the repressions, the more incapable is a human being of showing good humor, the more surely is everything of the nature of a complex eliminated from the sphere of the form-interpretations; but the more surely is it to be found in the kinesthetic and color interpretations.

Hence we see that the kinesthetic interpretations offer a deep insight into the unconscious. They betray the unconscious tendency of the subject, his fundamental attitude of expectancy (*Erwartungseinstellung*), whether active or passive. The color interpretations are symbols corresponding to the dream symbols, and their signification in the unconscious is another, but betrays the powerful affect-relations of this other, namely, of the latent content. Form-interpretations are mostly free from complexes. The stronger the repressing tendencies, the more unsubjective, the more objective, the more free from complexes they are. The abstract interpretations form the relations between the kinesthesia and the colors, between the unconscious expectative adjustment and the affect-laden aims of the unconscious. The *practical* value of all this can only be inferred from a large amount of material, but the facts thus empirically gathered ought to furnish important contributions to a theory of the connection between the systems of the conscious and of the unconscious.

SUMMARY

We take the psychogram first of all. I call that a formal psychogram which gives what can be gathered from the records alone, not from the contents of the interpretations, but from the formal qualities,

whether one knows the subject or not. The formal psychogram broadly tells us the following about our patient:

He is a neurotic, and his neurosis, seeing that his type of psychic reaction is introversive, more introversive than extratensive, but relatively near to ambivalence, must produce predominatingly psychasthenic symptoms, but also obsessional phenomena, and at least, from time to time, hysterical symptoms. The main features of the neurotic character of the subject are his ideas of insufficiency, want of harmony with himself, the feeling of incapacity of obtaining unity, brooding about himself, distrust of his own efficiency, ambivalence phenomena, fluctuation between lofty and finical qualities, impulsiveness, and passionateness, interrupted by hesitancy and anxiously depressive adaptation, a tendency to autistic phantasies and inferences, particularly to autistic constructions, a tendency to asceticism and a lack of decision. The forms adopted by the special bodily symptoms cannot be gathered from the record.

By the side of the neurosis we have a good intelligence, original thinking, above all, concrete thinking, and a slight weakness of abstract thinking, a special disposition for constructive thought processes and—which is not the same—constructive talent, but, on the other hand, little combinatory phantasy. Further, a strong power of application, some tendency to pass over what is essential and practical, either in order to construct immediately whole connections or to remain hanging to immaterial details. On the whole, a reduced capacity of participating in the mode of sensing of the crowd: a good deal of "personality" (*Eigenart*) and a tendency to self-brooding (*Eigenbrödelerei*). On the whole, too, a reduction of the free affective power of adaptation; the affects fluctuate between egocentric dejection and heaviness of heart, depressions and anxieties. We might say that a certain kind of fundamentality of adaptation is expressed in the chiaroscuro interpretations, and the whole record, with its obsessive accords, leads us to think of a somewhat obsessive principiant who lives up to certain principles with a slight note of fanaticism, at least with a certain constant zeal. This is likewise expressed in the programmatic style of his thinking which has been hinted at.

The comparison between the formal psychogram and the contents: The experiment alone tells us that the unconscious expectative adjustment (*Erlebniserwartungseinstellung*) is a passive one, and the color interpretations that there must be affect-laden complexes in repression. The abstract interpretations and their relation to the kinesthesia show us that the unconscious adjustment is seeking for a

power to take hold of, and the relation of this fact to the colors shows that this helping power must in some way be symbolically expressed by the contents of the color interpretations. Fundamentally these judgments are still of a *formal* nature, gathered from the comparison between the qualities (*F, B, Fb*) and the content of the interpretations. But now the psychoanalytical judgments come and complete the formal qualities in a few words. The abstract interpretations are the wishes that the subject would "live." The force and power of which they speak is the aim and object of the passive adjustment, the force of the father, which he unconsciously would like to experience, and that which is expressed in the color interpretations are symbols of the father and his force. The neurosis arose out of the conflict between this unconscious longing and the consciously repressing force. How many earlier and still more primitive adjustments and tendencies may have collaborated we do not know.

CURRENT LITERATURE

II. SENSORI-MOTOR NEUROLOGY.

6. BRAIN, BASAL GANGLIA, TUMOR, APOPLEXY, CORTICAL FUNCTIONS.

Briceno. Rissi, BRAIN ABSCESS. [Gas. Méd. d. Caracas, October 31, 1921, XXVIII, 20.]

This clinico-surgical report details the happy outcome in two apparently moribund patients for whom operative relief of a fortunately diagnosed frontal abscess, from sinus and maxillary infections, resulted in complete recovery.

Marburg, O. NEUROEPITHELIAL TUMORS (Blastoma ependymale). [Arbeiten aus dem Wiener Neurologischen Institut, XXIII, 1921, p. 192.]

In a woman fifty-one years of age a process had developed in the course of half a year which could be recognized as a tumor formation in the upper cervical cord. At the beginning there was paresthesia of the right hand which led to paralysis after nine months. Paralysis of the right foot appeared, finally also of the left upper extremity. She was unable to walk. All this in the period from July, 1918, to May, 1919. On admittance the symptoms were somewhat hoarse speech, pulse 120, difficult breathing because of paralysis of the diaphragm, right spastic paralysis of the upper extremity with indication of claw-hand, at the left the same but less severe. Paralysis of the lower extremities at the right more than the left and active increase of reflexes. A disturbance of sensibility which embraced only at the right the region from C² to C⁵ and D² to D⁶. Deep sensibility of the toes unaffected. Retention of urine. Syndrome of fluid compression indicated. A tumor at the height of C⁴ was assumed. The patient died of pneumonia before the operation and there was found a tumor consisting of ependymal cells which extended from the middle of the cervical cord to the beginning of the oblongata, in which the ependymal cells had formed tubes, and the whole was complicated by neuroma formations in the pia and the roots and a cavity formation in the posterior column. Quite similar tumors in part even with cavity formations have already been described by a number of authors. They have different locations, have always an intraspinal position, show internally clear tube-like formations, which in part at least are in connection with the central canal, therefore a tumor constructed from ependymal formative cells (Blastoma ependymale). The tumor is interesting because connected with a true hyperplasia and true neuromata,

by which it approximates on the one hand neurofibromatosis (neurinomata) and on the other true hyperplasia. Explanation of the cavernous formation is attempted as exogenous rather than endogenous. Considering this connection, we may divide the processes of blastomatosis into tumors which arise before the differentiation of the elements, therefore before the segmentation of the neural crest. These tumors probably contain neuroepithelium, that is, ependyma. Tumors of the second phase, that is, during the differentiation of the elements, may contain, beside the first named, ganglion and glial cells, or if they arise from the neural crest, ganglion cells and neurinoma tissue. These tumors may develop from deficiency of embryonic elements up to the third month. The tumors after the third month, that is, after differentiation of the elements, must already bear within them signs of functional capacity of the elements. Here belong certain forms of gliomata with evident fibrillo-genesis. [Author's abstract.]

Perdrau, J. R. SARCOMA OF BRAIN. [Journal of Pathology & Bacteriology, April, 1921, XXIV, No. 2.]

A pathological genetic study of neuroblastomata. The author discusses two cases of so-called sarcoma of the brain which show characters pointing to a neural origin and are, therefore, true neuroblastomas. In the first case the bipolar neuroblast is the prototype of the tumor, and in the second case the unipolar (or pear-shaped) neuroblast, the latter being the more malignant one of the two.

Monakow, C. BRAIN TUMORS. [L'Encéphale, April, 1921, XVI, No. 4.]

Monakow describes glioma in particular, with four fine plates and analysis of his eighty-six cases, only thirty-one operable. Four patients seem to be cured since the removal of the growth, but three of them were left with hemiplegia. The period of latency may be very long, and the psychasthenia and hysteric and epileptoid conditions may prove very puzzling for the physician. A combination of trauma and emotional stress was noted in nearly every case. Headache and vomiting are comparatively late symptoms.

Meyer, A. W. BRAIN TUMOR AND ELECTRICAL RESISTANCE. [Zentralbl. für Chirurgie, December 17, 1921, XLVIII, p. 1824.]

The localization of brain tumors is often very difficult, even after opening of the dura, for palpation and even puncture in various directions may fail to reveal a tumor. Meyer has tried to find a more reliable method. By means of an apparatus devised by Schlüter (described on p. 1827), he finds that there is a very much lower electrical resistance in brain tumors than in brain tissue. Thus, in cadavers the electrical resistance of the cerebrum amounts to 550 ohms, that of the cerebellum to 650, while a gliosarcoma had one of only 250; cerebrospinal fluid has a resist-

ance of 35 and blood of 150 ohms. Similar values were found in living cats. There is thus a great difference between the electrical resistance of normal brain tissue and that of tumor tissue. In a patient who was operated on, Meyer found similar figures: the resistance of the cerebellum was 660 ohms. When the electrode was placed on the spot where the neurologist had localized the tumor (the case was a cerebellopontile angle tumor) the apparatus registered only 260 ohms; the tumor appeared to be a gliosarcoma. The study of the electrical resistance at the operation had no bad effects on the patient, and the same was true of the cats experimented on. [Leonard J. Kidd, London, England.]

Lange, C. CEREBROSPINAL FLUID IN BRAIN TUMORS. [Mitteil. a. d. Grenzgeb. d. Med. u. Chir., 1921, XXXIII, No. 5; J. A. M. A.]

Lange has examined over 5,000 specimens of cerebrospinal fluid in the last twelve years, including a large number of brain tumor cases. In five recent ones the diagnosis was confirmed by the findings in the lumbar puncture fluid. In thirty brain tumor cases as much as 20 or 30 c.c. of fluid had been sent in, and no instance of disturbance from withdrawal of such a large amount of fluid was known. The attending physicians were always surprised when told the actual amount. It is always underestimated, while 5 c.c. is ample for all tests of the fluid. On suspicion of a brain tumor, 1 or 2 c.c. will suffice. There is no specific change in the fluid from the presence of the tumor, but on account of the capillary hemorrhages the fluid shows changes which differ from those under other conditions. The cytodagnosis is of no aid, and the Wassermann is useless or even misleading. The Lange gold sol reaction and the yellow tint are the only dependable criteria of a tumor.

Constantini, F. TEMPORAL LOBE TUMORS. [Policlinico, November 1, 1921, XXVIII, Med. Sect. No. 11.]

Two cases here reported show that general symptoms occur early with a tumor in the temporal lobe, especially mental disturbances varying widely from case to case. Not one of the focal symptoms is constant, and there may even be nothing to call attention to the temporal lobe as the seat of the process. The more important of the focal symptoms is aphasia in its various forms.

Spiller and Frazier. CLASSIFICATION OF BRAIN TUMORS. [Am. Archives of Neur., November, 1921, VI, No. 5; J. A. M. A.]

Besides reporting eight cases, Spiller and Frazier present a classification of brain tumors. The following cases have been selected as representing tumor types and various locations: (1) an endothelioma of the left occipital lobe; (2) a tuberculoma of the parietal lobe near the motor cortex; (3) an encapsulated glioma of the motor area; (4) a calcified endothelioma of the falx; (5) an unusually small endothelioma near the motor cortex; (6) a fibroma of the posterior fossa, origin undetermined,

(7) a glioma of the cerebellar hemisphere; (8) an acoustic tumor (fibroma).

Linck. ABSCESS OF BRAIN. [*Deutsche Zeitschrift für Chirurgie*, September, 1921, CLXVI, Nos. 1-4; J. A. M. A.]

Linck concludes from the experiences related that there is no essential difference in the course or findings between a traumatic abscess in the brain and a pure inflammatory abscess consecutive to ear disease. In two of four cases described the abscess induced only general symptoms, headache, and the pressure pulse, but the preëxisting right otitis media gave the clue along with the lack of cerebellar symptoms. The abscess was in the right temporal lobe in one case, and the return of symptoms later with choked disc indicated a second abscess which was found in the occipital lobe. The diagnosis each time had been made by puncture, after several negative punctures with the second abscess. In another case there were no general symptoms indicating an abscess after the trauma of the skull, but the roentgen rays revealed the abscess in the frontal brain as a little air had got into the cavity. The outcome with a brain abscess depends on whether the system is capable of walling in the abscess with an encapsulating barrier or whether it is in a bed of necrotic brain tissue. On direct inspection with the forehead light and speculum, the color of the abscess wall is more yellowish in the latter contingency, and the walls of the abscess crowd together more. In some cases—and these were always the ones with a fatal termination—the walls crowded together so that it was impossible to get a view of the abscess cavity, even when the patient was raised to a sitting position and told to breathe deep and hold his breath. It was possible in three of the four cases described to estimate from the cerebrospinal fluid and the bacteria in the pus that the infection and inflammation were not spreading. In the other case, the increasing turgor in the brain, the appearance of leukocytes in the previously clear fluid, and the choked disc testified to the lack of encapsulation, confirmed by necropsy. He commends tamponing with moderately wide strips of iodoform gauze, without raw edges, through the Voltolini speculum, packing the whole cavity loosely but filling it up to the surface of the brain. The tampon is then held in place with forceps while the speculum is withdrawn, and the external wound is likewise packed with iodoform gauze. Nothing is done blindly. The edema in the brain rapidly subsides and, when the gauze is changed the second or third day, the cavity is found entirely empty as a rule when examined anew with speculum and forehead light, the patient seated. If pus still lurks in any crevice, this is remedied now. The speculum tamponade is continued until the cavity is covered with healthy young cells; then a rubber drain may be used. This stimulates granulation at this stage. When the encephalitic process is spreading, vaccines or antisera or other general measures may prove useful adjuvants.

Stiefler, G. SEBORRHOEA FACIEI AS A SYMPTOM OF LETHARGIC ENCEPHALITIS. [*Ztschr. f. d. ges. Neurol. u. Psychiat.*, 1921, LXXIII, 455.]

From a study of the literature Stiefler finds that six cases of lethargic encephalitis presenting a Parkinsonian syndrome have been described in which a localized seborrhoeic condition of the face was noted. He records in addition two personally observed cases. The skin of the face was puffy and greasy, and after thorough washing the condition ("Salbengesicht") soon returned. A finger rubbed across the skin becomes greasy and a smear examined microscopically shows the presence of numerous minute fatty particles. The condition develops with the Parkinsonian syndrome and clears up on recovery, when this occurs. Sarbô, who recorded one of the six cases in the literature, discusses the value of the symptom as a localizing symptom referable to the corpus striatum. Stiefler regards it as possibly dependent upon aberration of nervous control over the sebaceous glands, which control may normally be inhibitory in quality and emanating from the corpus striatum. He identifies it as a seborrhoea faciei. [F. M. R. Walshe, *Med. Sc.*]

Steck, A. PATHOLOGICAL ANATOMY OF TRUE POSTHEMIPLEGIC ATHE-
TOSIS. [*Schw. Arch. Neur. u. Psych.*, Vol. VIII, No. 1.]

Steck throws valuable light upon the localization of the motor disturbances of the striatum through a histopathological report of a case of typical posthemiplegic athetosis lasting for twenty years. The nucleus caudatus especially was destroyed, the putamen and external capsule in part. There was secondary degeneration of the lenticular pathways and of the lenticulo-thalamic fibers, also in the globus pallidus, in the ventral and lateral nuclei of the thalamus, etc. The nucleus ruber was intact. [J.]

Jacobi, W. MENTAL DISTURBANCES IN TUMORS OF THE BASAL GANGLIA.
[*Monatschr. f. Psychiat. u. Neurol.*, 1921, XLIX, 3.]

The mental syndromy of basal ganglia involvements is disentangled with considerable difficulty since its implication, as in encephalitis, is usually complicated by other extensions. In 1902, Schuster collected reports of a series of fifty-four cases of tumor of the basal ganglia, in which mental disorders were recorded, and concluded that in no case was the psychical disorder of localizing significance. Pfeifer reported three cases of basal ganglia lesion with the Korsakow syndrome, and others with convulsive manifestations, but he also could not conclude that these symptoms possessed any localizing value. The mental inertia, forgetfulness, and somnolence described by Veronese as characteristic of tumors in this region, Pfeifer refers to the general rise of intracranial tension associated with any intracranial tumor. Various manifestations of a psychical nature have been recorded by different writers, but neither their occurrence nor their form are constant or characteristic, and Redlich,

Bruns, and Oppenheim have insisted that tumors in this region may run their course without any evidence of mental disturbance. Jacobi reports three personally observed cases, but in each of them there is evidence of such severe compression of the brain, from direct pressure of the growth and from secondary internal hydrocephalus, that they are useless as psychiatric material.

Hunt, J. Ramsay. SYMPTOMS AND SYNDROMES REFERABLE TO THE BASAL GANGLIA IN EPIDEMIC ENCEPHALITIS. [Special Abstract of recent publications, 1919-1922.]

No other acute affection of the central nervous system has yielded so many and such striking evidences of involvement of the great basal ganglia as encephalitis lethargica. This has not only added materially to our knowledge of the symptomatology of these structures but has also enabled us to test the validity of our present theories concerning the functions of this important region of the brain. While the optic thalamus is frequently involved in encephalitis, the thalamic symptoms are milder and less serious than are those of the striatum, and the chief emphasis of this study is placed upon the latter.

Anatomical Considerations.—The corpus striatum is a large ganglionic structure which is divided by the anterior limb of the internal capsule into two parts, the nucleus lenticularis and the nucleus caudatus. The nucleus lenticularis is still further subdivided into an external segment, the putamen, and an internal which is termed the globus pallidus. The putamen and caudate nucleus are identical in histological structure and constitute the *neostriatum*. The globus pallidus is composed of two segments, an inner and an outer, which is produced by the fusion of nerve fibers in the lateral and mesial medullary laminae. This portion of the striatum is older phylogenetically and termed the *paleostriatum*.

Cell Types of the Corpus Striatum.—In the opinion of the writer a much greater importance is to be attached to the cellular types of this region than to the gross anatomical appearance and subdivisions. The paleostriatum (pallidum) contains aggregations of large multipolar cells which are histologically of the motor type (paleostriatal or pallidal cells). The neostriatum (caudate and putamen) is composed of two cell types. Of these the more numerous are small, polygonal cells which give the characteristic picture of this region (neostriatal cells). Scattered among these small cells are cells of much larger size of motor type. The motor or pallidal type of cell is present therefore in both paleostriatum and neostriatum, while the small neostriatal cells are peculiar to the neostriatum. The motor cells (pallidal cells) have long axis-cylinder processes and correspond to Type 1 of Golgi's classification. These pass by way of the ansa lenticularis and ansa peduncularis to important nuclei in the thalamic and hypothalamic regions and form the efferent motor system of the corpus striatum (*pallidal* or *paleostriatal system*).

The small ganglion cells of the neostriatum have short axis-cylinder processes and correspond to Golgi's Type 11. They terminate in the outer or inner segments of the globus pallidus. The small neostriatal cells represent a short interstriatal system which unites the caudate nucleus and putamen with the cells of the pallidal system (*striopallidal* or *neostriatal system*).

Pathological Physiology.—Our knowledge of the functions of the corpus striatum has been greatly extended by the pathological study of three chronic disorders of the central nervous system: the double athetosis, progressive lenticular degeneration, and juvenile paralysis agitans. In 1917 the writer was able to demonstrate in juvenile types of paralysis agitans widespread atrophy and loss of the large pallidal cells of the corpus striatum, and referred this disorder to a primary atrophy of this motor projection system of the corpus striatum (*primary atrophy of the pallidal system*). The peculiar and characteristic feature of this lesion was its limitation to a special system of motor neurons. When the pallidal system is diseased there is produced the motor syndrome which we associate with paralysis agitans. This is characterized by paralysis of automatic associated movements, muscular rigidity, and rhythmical tremor (pallidal or paleostriatal syndrome). The writer also pointed out that the small ganglion cells of the neostriatum which were well preserved in juvenile paralysis agitans (primary atrophy of the pallidal system) showed extensive degeneration and atrophy in Huntington's chorea. The small neostriatal cells were supposed to be coördinating and inhibitory in character. Because of this elective atrophy of special systems of cells the syndrome chorea was referred to a loss of the striopallidal or neostriatal system, and the syndrome paralysis agitans was referred to a loss of the pallidal or paleostriatal system.

Two fundamental syndromes of the corpus striatum were therefore recognized based upon the differences of function of these two cellular systems.

1. A paleostriatal syndrome (*pallidal syndrome*), characterized by paralysis of automatic associated movements, muscular rigidity, and tremor caused by a lesion of the efferent pallidal system of the corpus striatum.

2. A *neostriatal* syndrome, characterized by spontaneous movements of the automatic associated or choreiform type caused by a lesion of the striopallidal system (neostriatal system). Involvement of the pallidal system would cause a paralysis of movements of the automatic associated type, while involvement of the striopallidal system releases this motor center from control, with the development of spontaneous movement of the automatic associated type. One is a paralytic lesion; the other a discharging lesion. The great variation in the symptomatology of the corpus striatum would therefore be dependent upon the relative degree of involvement of these two systems.

Striatal Types of Epidemic Encephalitis.—During the recent epidemic of encephalitis lethargica all of the symptoms which we commonly associate with affections of the corpus striatum have appeared in one form or another. These manifestations have been slight or severe, transitory or progressive, general or local. In addition, many bizarre and fragmentary motor manifestations have been observed which were probably also of striatal origin. The writer's personal experience is based on the study of twenty-five cases in which evidences of striatal involvement were present at some period of the disease.

Symptoms referable to the corpus striatum occur very frequently in the acute stage of the disease and are evidently associated with an early localization of the inflammatory process in this region. They may also appear at a later period after all acute symptoms of the disease have subsided. Very remarkable is the appearance of striatal symptoms as late sequelae, weeks or even months after apparent recovery, suggesting a recrudescence of the infectious process.

Striatal symptoms are of two types, corresponding to the two chief syndromes of the corpus striatum, as already defined.

There is a *paleostriatal* or *pallidal type* characterized by paralysis agitans and there is a *neostriatal type* characterized by choreiform movements. While these two clinical syndromes may appear in pure form there is often an admixture of the two, as a result of which many curious clinical pictures are produced. *Mixed striatal types* are characterized by a combination of the symptomatology of both paralysis agitans and chorea, a mixed paralysis agitans choreiform type. Of the two the paralysis agitans type is the more frequent and usually the more severe in its manifestations. This is probably due to the course and relations of the pallidal system and the closer proximity of the paleostriatum to the midbrain, which is the chief center of the inflammatory area. Of the 25 cases which came under his personal observation, 18 were of the paralysis agitans type, 4 of the choreiform type, and 3 were mixed striatal types.

Paleostriatal or Pallidal Type (Paralysis Agitans Syndrome).—The paralysis agitans type is characterized by a fairly acute involvement of the voluntary musculature. Within a brief period of two or three days there develops the typical muscular rigidity, postural deformities, mask-like expression of the face and the paralytic disturbances of motility characteristic of paralysis agitans. Generally speaking, the tremor is much less constant and when present less conspicuous than in true paralysis agitans. This is probably caused by the sudden development of massive rigidity which masks the tremor, producing the clinical type known as *paralysis agitans, sine tremore*. When tremor is demonstrable at this stage it is usually slight and localized in the tongue, face, or hands. The characteristic pill-rolling movement which we associate with paralysis agitans is quite rare, and he has only observed it as a late residual symptom in two cases, and never in the acute stages. On the

other hand, the muscular rigidity, the paralysis of automatic associated movements, the mask-like expression of face, the posture of the hands and arms, the gait and attitude appear early and are identical with those observed in true paralysis agitans. One side is frequently more affected than the other, and *hemilateral types* are encountered in a late stage of the disease. Even more limited forms occur (*segmental types*), as, for example, isolated involvement of the face (the Parkinsonian mask). Involvement was also limited to the upper or lower extremities. The *segmental types* were only observed after the subsidence of the acute stage as a late residual manifestation. The tremor may show a similar limitation and typical rhythmical tremor may be hemilateral or sometimes segmental, *i.e.*, confined to the head, an arm, or a leg. These fragmentary clinical types are usually encountered only as late or residual symptoms.

Abortive Types.—It is also interesting to note that in the acute stage of the disease mild transitory striatal symptoms are sometimes present. These consist of a certain tightness or tenseness of the musculature, a certain monotony and mild fixity of expression, with slight tremors of the tongue, face, or extremities, which disappear as the acute symptoms subside. Cases of this type do not, however, always abort, and these initial symptoms may be the forerunners of more serious striatal involvement.

Progressive Type.—A tendency to progression in the paralysis agitans group is not uncommon. It would appear to depend upon a renewal of the inflammatory process or an actual lighting up of old lesions.

A relapsing form, unfortunately not uncommon, is a well-recognized type of the disease. He has observed two very striking examples of the mixed striatal type in which there was a well-marked tendency to relapses extending over a period of one year.

Pallidopyramidal Types of Encephalitis.—In previous studies of the symptomatology of the efferent pallidal system of the corpus striatum attention was directed to the existence of pallidopyramidal types of palsy. This form is characterized by a combination of the symptoms of both spastic paralysis (pyramidal tract system) and paralysis agitans (pallidal system), and is by no means uncommon because of the close anatomical relationship of the internal capsule and the corpus striatum. In pallidopyramidal types paralysis is more complete because both the pyramidal and the extrapyramidal systems are involved, the one controlling isolated synergic movements of cortical origin and the other striatal movements of the automatic associated type. The muscular hypertonicity is also greater and combines the peculiar features of spasticity and paralysis agitans rigidity. Especially characteristic of the pallidopyramidal types are exaggerated tendon reflexes, clonus, and the Babinski phenomena of the spastic type in conjunction with a loss of automatic associated movements of striatal type. It is rather remarkable that in my series of twenty-five cases of striatal encephalitis definite involvement of the pyramidal tracts was only noted in three cases.

The Neostriatal Type (Chorea Syndrome).—The other essential syndrome of the corpus striatum which may develop as a result of epidemic encephalitis is chorea. The choreiform movements of striatal origin are involuntary and irregular in character and are of the automatic associated type. The choreic movements may be general, hemilateral, or segmental (local) in their distribution. They also vary somewhat in character, *e.g.*, mild and severe, large and small amplitude, and occasionally rhythmical. A certain degree of hypertonicity is sometimes present, giving an athetoid character to the movement. Athetosis or choreo-athetosis he regards as an admixture of chorea and muscular rigidity due to involvement of both the neostriatal and pallidal systems.

Acute Choreiform Type.—Some writers on the subject of encephalitis have described cases characterized by generalized choreiform movements appearing in the acute stage of the disease, associated with delirium and other severe psychotic symptoms. A clinical picture very similar to the chorea insaniens of systematic writers. This acute choreiform type is apparently rare, and Hunt encountered no cases in the New York epidemic. He did observe, however, a number of cases of the "myoclonic type" which were associated with delirium. This form of movement may resemble but must be sharply distinguished from chorea.

Choreo-athetoid Types of Movements.—In addition to chorea, movements of an athetoid and choreo-athetoid type may also occur, both in the early and late stages of the disease. Of special interest is their appearance as late sequelae months after apparent recovery. The movements of this type, like those of chorea, may be general, unilateral, or segmental (local) in distribution. They differ from chorea in being slower, more stereotyped, and associated with hypertonicity of the affected muscles. Belonging to this group are other types of movement of somewhat larger amplitude which affect more particularly the trunk and root portions of the extremities, causing curious contortions of attitude and gait. Some of these movements bear a striking resemblance to those observed in the dystonia group of motor disorders, which, since the autopsy report of Thomalla (*dystonia lenticularis*), must now be definitely allied with the symptomatology of the striate body.

Rhythmical Chorea (Bradykinetic Oscillation).—This disorder of motility varies somewhat from the recognized lenticular types. It is characterized by slow rhythmical movements of an extremity, sometimes involving both the arm and leg on the same side, and occurring with great regularity, eighteen to twenty movements to the minute. With the slow rhythmical oscillation of the extremity there is a simultaneous hardening of many of the muscles of the arm or leg, showing the diffuse nature and wide distribution of the muscular contractions. This form of spontaneous movement, in his opinion, is referable to the extrapyramidal system and in all likelihood to the striatal mechanism. It differs, however, in the monotonous regularity of its synchronous rhythm and stereotyped repetition from other forms of striatal movement.

Mixed Striatal Type (Mixed Choreiform and Paralysis Agitans Types).—While the paralysis agitans and choreiform types may occur in pure form it is well to emphasize the fact that these two clinical pictures are not infrequently combined in greater or less degree. Indeed, among the most striking features of involvement are the many bizarre combinations which unite both the elements of chorea and paralysis agitans. The explanation for such clinical combinations, he believes, is to be found in the existence of two striatal systems, a neostriatal and a paleostriatal (pallidal), yielding their respective syndromes of chorea and paralysis agitans, the one a convulsive and the other a paralytic manifestation of the corpus striatum.

The Thalamic Types.—The optic thalamus is the sensory counterpart of the corpus striatum. It is the great ganglionic station where the neurons of the secondary sensory paths terminate for final grouping and distribution. Lesions in this region may produce sensory symptoms of the following character: Spontaneous pain of intolerable intensity and of persistent character; loss of superficial and deep sensibility with anesthesia; ataxia and astereognosis. There may also be present slight hemiplegia as well as choreic and athetoid movements. The sensory loss and pain are alone of thalamic origin; the other symptoms are referable to surrounding parts. Symptoms of thalamic origin are not infrequent in cases of epidemic encephalitis. They are often associated with evidences of striatal involvement, but in his experience are neither so severe nor well defined. He has observed no case presenting the complete thalamic syndrome as outlined by Dejerine and Roussy. His experience has been limited to sensory symptoms which it seemed reasonable to assume were of thalamic origin, although one could not deny their possible relationship to the central sensory mechanism of the spinal cord and brain stem. He believes that the thalamic symptomatology is largely limited to intractable and persistent pain associated with mild evidence of sensory loss, especially of pain and temperature sensibility.

Goodhart and Tilney. BRADYKINETIC ANALYSIS OF MOTOR DISORDERS. [Neur. Bull., September–October, 1921, III, Nos. 9–10.]

In common with other observers, Goodhart and Tilney have studied motor disorders by the cinema methods, but they have also advanced to a special series of observations by means of ultrarapid moving pictures taken at the rate either of 160 or 300 exposures per second. The cinematographic rate is sixteen exposures per second. Thus there is offered a better opportunity for the study of every component in each movement. Bradykinetic analysis is the result. The motor disorders submitted to bradykinetic analysis include choreiform movements, torsion spasms, extreme intention tremors, and cerebellar ataxia. These motor defects occurred in cases of chronic degenerative chorea, atasia abasia, dystonia musculorum deformans, multiple sclerosis, and congenital cerebellar aplasia. Their analysis indicates that all purposive movements depend

on the concurrent and synchronized operation of the kinetic and static mechanisms. Such movements are made up of a series of postures beginning with an initial posture and concluding with a terminal posture. Every act is made up of a series of postures.

Mammele, H. HYPERTHERMIA WITH SCLEROSIS OF BASAL GANGLIA. [Monatss. f. Kind., April, 1920.]

The author states that no cause for a persistent high temperature in the seventeen months' infant could be discovered until autopsy showed sclerotic processes in the basal ganglia. Drug tests of the sympathetic nervous system had shown that the temperature anomaly must be of central origin.

Schob, F. HEMICHOREA AND HEMIATHETOSIS FOLLOWING A SKULL INJURY. [Deutsche Ztschr. f. Nervenhe., 1920, LXV, 210.]

Hemichorea and hemiathetosis are rare sequels of skull wounds. Schob has been able to find but two cases recorded during the period of the present war, while v. Monakow has collected the few pre-war examples in his "Gehirnpathologie" (S. 538). Schob's case was that of a sailor who, seven years before coming under observation, had received a severe fracture of the right parietal region of the skull from a revolving anchor capstan. At the time the right half of the vertex was severely damaged and the underlying brain contused. There was left hemiplegia with periodical epileptiform fits. With the gradual recession of the paralysis, involuntary movements appeared in the limbs of the left half of the body. Clinical examination showed that these involuntary movements contained three elements: (1) rapid jerky choreiform movements involving arm, leg, and face; (2) slower, sinuous, writhing movements of athetotic form in hand and hallux; (3) a more or less continuous mobile spasm of the arm and foot. There were, in addition, signs of a moderate degree of impaired function of the pyramidal tract on the left side; that is, hemiparesis with the usual reflex alterations. There was also hemianesthesia. It was noted that operation, the trimming off of irregular bony fragments, and the evacuation of a cyst, resulted in marked diminution of the choreiform movements, but not of the athetosis, while during his fits the same dissociation was found, the chorea ceasing, while the athetosis persisted. [Walshe, Med. Sc.]

Moleen. PATHOLOGY AND TREATMENT OF CHOREA. [Col. Med., March, 1921.]

Moleen points out that it is justifiable to conclude that chorea is the result of the general toxic blood state or of local action of a micro-organism in the cerebral cortex; and that this organism is closely allied to or an evolutionary development of the diplococcus or diplostreptococcus of rheumatic fever. The greatest liability or danger in the disease is in the involvement of the endocardium. Focal infections are to be

seriously considered in all cases, but operative measures, especially on tonsils, should be deferred until the acute period of the attack has passed, as manipulation is likely to be followed by violent aggravation of all manifestations, including the implication of the serous membranes. The most effective treatment aside from the symptomatic is that which may be directed against the microbic infection, namely, salicylates, either by mouth or intravenously, increasing the dose until the physiologic effects are reached. Arsenic and hematinics are essential for the reestablishment of the constantly associated lowered blood values rather than as direct antagonists of the cause of the disease. [J. A. M. A.]

Terrien, E. ORGANIC HEMIPLEGIA AFTER POISON GAS. [Paris Méd., February 14, 1920.]

This is a clinical study of two cases in which hemiplegia resulted from war gassing. In the first a right hemiplegia developed in six weeks. It was incomplete, and cleared up in a few weeks. In the second case complete left hemiplegia occurred three weeks after inhalation of the gas. The condition was probably due to embolism or arteritis of the Sylvian artery. In the first case the arterial lesions were slight. In the second case the arterial lesions were more profound, causing necrosis of the corresponding nerve elements and degeneration of the pyramidal tract. The possibility of the hemiplegia being due to a hematoma in the Rolandic area is also suggested by the author.

Froment, J. REÉDUCATION IN ATAXIC APHASIA. [Paris Médical, October, 1921. XI, No. 40.]

Much valuable work has of late been recorded in the reéducation of hemiplegics and of motor aphasias. Froment takes up anew the problem of the principles, the procedures, and the results of training in cases of motor aphasia. There is no necessity for training the muscles. Their function as such is not lost, and it will be regained when the attention is diverted so as to give them a chance for automatic coördinated action. Concentration on the evoking of the memory of the combinations of sounds which characterize words is the prime requisite. In aphasia the loss of part of the capital of words is secondary to the inability to use what still remains. This mental deficit is not very pronounced, but it determines the prognosis. The aphasic patient has to be educated in a manner entirely different from that used for the child. The teaching exercises may have to be kept up for a year or more and daily exercises are absolutely necessary.

Hassin. CASE OF CEREBRAL POROSIS: HISTOPATHOLOGIC REPORT. [Arch. of Neur. and Psych., December, 1920, IV, No. 6.]

The most striking pathologic features in Hassin's case are the cavities, the bacillar venous thrombosis and the subarachnoid changes. The most striking clinical phenomena are the bronze skin and mental dulness.

Both clinical and pathologic findings are most probably a manifestation of the gas bacillus infection, of which the cavities are the most outstanding pathologic features.

Parletti. PATHOGENESIS OF CEREBRAL HEMORRHAGE. [Rif. Med., January 24, 1920.]

The author argues for a rearrangement of current pathological concepts of cerebral hemorrhage being due to changes in the blood vessels and increased endoarterial pressure exclusively. The ex-vacuo theory in a modern form is suggested. Instead of bleeding people who suffer from cerebral hemorrhage, he says it would be better, especially as a preventive, to increase the intracranial pressure by injecting artificial serum into the spinal canal. Hemorrhage is induced by some enlargement of the space between the brain and skull, and subsequent distension of the veins and small arteries until they burst, so that by injecting serum into the spinal canal the intracranial pressure would be increased and the tendency to hemorrhage checked. A better explanation of the premonitory symptoms of cerebral hemorrhage (giddiness, headache, etc.) is diminished endocranial pressure and consequent expansion of the vessels.

Inman, T. G. CEREBRAL THROMBOSIS AND ABRUPT SLOWING OF CEREBRAL CIRCULATION. [J. A. M. A., December 25, 1920.]

To the three circulatory catastrophes, hemorrhage, embolism, and thrombosis, which suddenly affect the brain, a fourth is added by the author, which, because of its occurrence in weakened states of the circulatory organs, may conveniently be called abrupt slowing of the cerebral circulation. The more or less mild phenomena characterized by transient attacks of dizziness, amnesia, aphasia, muscle paresis, paresthesias, and the like, occurring in patients with generalized arteriosclerosis either with or without associated high blood pressure, seem to depend on a more or less abrupt slowing of the cerebral circulation carried to a degree at which a localized area of the brain is temporarily deprived of its customary amount of arterial blood. Attacks with a more extensive distribution, simulating the hemiplegias due to actual brain destruction but transitory in nature, may occur. Treatment directed to the lowering of blood pressure in a patient who has not been for some time under observation may be fraught with disastrous consequences, for the pressure reading obtained at the first examination, while considerably higher than what is supposed to be normal, may be too low for that individual under the conditions existing at the time the examination is made. To relieve the symptoms present at that moment a rise in pressure may be necessary. All treatment directed to the prevention of cerebral thrombosis and localized cerebral anemia must have for its ultimate object the prevention of slowing of the circulation within the brain. Dietetic treatment, such as the limitation of proteins and salt, care of the overloaded colon, limiting

the amount of intensive mental work, avoidance of worry, and exercise in the open, each has its advocates, and each or, better, all combined have some value in combating the influences that further the progression of this disease. Of first importance is the avoidance of fatigue. Carefully selected food administered in frequent small feedings, rather than in larger meals, will prove of benefit. The iodids seem to be of some value when given continuously over long periods. Strychnin in full doses, the last one of the day being administered at bedtime, has appeared to be useful.

Laignel-Lavastine. THE CORPUS CALLOSUM IN CHRONIC ALCOHOLISM. [Bull. et Mém. Soc. Méd. des Hôp. de Paris, December 2, 1920.]

Examination of the corpus callosum in two alcoholic subjects who died as a result of pulmonary complications detected atrophic degeneration of the myelin sheaths, together with a generalized perivascular rarefaction of the parenchymal tissue, accompanied in places by microscopic hemorrhage. Both patients had shown visual and auditory hallucinations.

Marburg, O., and Ranzi, E. BRAIN TUMORS. [Archiv f. klin. Chir., July, 1921, CXVI, No. 1.]

A review is here given of 318 cases of brain tumors which had been operated on in Eiselsberg's service since 1901. One hundred and thirteen cases were of removal. Of these 14 per cent were cured and 23 per cent materially improved, and 6 per cent showed transient benefit; 10 per cent failed to show improvement. Thus in 71 per cent of the 21 pituitary tumors, in 34 per cent of the 50 cerebral, and 31 per cent of the 16 cerebellar tumors, and in 18 per cent of the 26 tumors involving the auditory nerve, there were beneficial results.

Leshure, J. TEMPOROSPHEOIDAL ABSCESS. [Laryngoscope, February, 1920, XXX, No. 2.]

This anomalous clinical picture is reported because of the difficulties in diagnosis. The classical symptoms of brain abscess were all absent, he states. A persistent headache was the only direct evidence of deep-seated trouble. Incision into the right temporosphenoidal lobe revealed a large abscess from which 30 c.c. of pus was drained. The incision was enlarged and digital exploration revealed an encapsulated abscess not of recent origin. No communication with the middle-ear could be demonstrated.

Viets, H. BRAIN GLIOMA. [Bost. Med. & Surg. J., February 10, 1921.]

In this clinical report the author details the history of a patient with a brain tumor, glioma, of the right temporal lobe, which infiltrated and largely replaced the tissues of the lobe without deformity in the general shape of the brain. A large cyst was formed. The tumor extended to the base of the brain and bulb, where it ran in the subarachnoid space over a

large part of the ventral surface of the brain and extended down the spinal cord to the conus terminalis without invasion of any part of the central nervous system, except a small portion of the left cerebellum. The medulla and cord were greatly compressed by the tumor mass. The symptoms and signs of both a brain and a spinal cord tumor are recorded with the report of a negative surgical exploration. Both macroscopically and microscopically the tumor showed the characteristics of a malignant glioma. The case illustrates in a striking manner the tendency of glioma to extend along a serous surface without invasion.

Claude. MULTIPLE ABSCESSSES IN BRAIN. [Bull. d'Acad. d. Méd., November 30, 1920, LXXXIV, No. 38.]

The clinical history of a young man with pulmonary tuberculosis who began to complain of severe headache, and who died after three days of vomiting and mental confusion, is here reported. Innumerable abscesses throughout the cerebellum were found at autopsy. The cerebellum was infiltrated like a sponge. In spite of this, symptoms were noted only three days before death.

Mygind, H. OTOGENOUS INTRACRANIAL DISEASES. [Ugeskrift for Laeger, May 27, 1920, LXXXII, No. 22; J. A. M. A.]

Mygind analyzed 207 cases at the ear and throat clinic, including 35 per cent in which there were multiple intracranial complications. This material is studied from various standpoints, and also the indications for operative measures. The aim should be, he says, to enter the skull along the track of the infection or the most likely path. He insists on the necessity in every case of opening up the perpendicular part of the sigmoid sinus, to examine it thoroughly throughout. This sinus is involved far more often than would be supposed from the symptoms, while this form of craniotomy is comparatively harmless. In fact, he reiterates, every craniotomy that leaves the dura intact is harmless. Abnormal conditions in the temporal bone and vessels favor transmission of the infectious process. This explains the sudden and unexpected development of intracranial processes in the absence of retention of pus or other conditions usually responsible for the spread of infectious processes. The intracranial complication is a consequence which our prophylactic measures—operative or otherwise—may not be able to avert, owing to individual anatomic conditions.

Cushing, H. RETINAL FIELD DEFECTS PRODUCED BY TEMPORAL LOBE LESIONS. [Brain, 1921, XLIV, 341.]

This paper ranks in importance, if not in scope, with Cushing's classic monographs on eighth nerve and pituitary tumors. It deals in particular with certain defects of the visual fields which he finds to be the localizing sign of greatest importance in temporal lobe lesions, more especially tumors, and also gives a comprehensive description of the symptom-complex of temporal tumors. Of a series of 663 verified intracranial

tumors which have come under Cushing's observation, 276 have been tumors involving the cerebrum proper, and of these 59 have involved the temporal lobe. These form the material upon which the present paper is based. In an anatomical introduction, Cushing refers to Adolf Meyer's description of "the peculiar *détour* of the ventral portion of the geniculocalcarine path which simulates the existence of an inferior longitudinal fasciculus . . . a portion of the optic radiation, on leaving the geniculate body, plunges far forwards into the temporal lobe to sweep round the horn of the ventricle before it turns backward to end in the calcarine cortex." There are thus dorso-lateral and ventral bundles in the radiation, of which the latter takes the longer course and extends far forwards into the temporal lobe, to end finally in the anterior and lower part of the visual cortex. Three beautiful diagrams illustrate this anatomical point, and it will be understood that lesions involving the ventral bundle are responsible for defects in the upper quadrants of the visual field. It is interesting to note that this conclusion is in strict accord with Gordon Holmes's observations on the cortical representation of vision. For the first time the clinical aspect of this anatomical fact is fully described and worked out. In thirty-nine of Cushing's cases of temporal lobe tumor the state of vision and of the patient allowed of a careful perimetric study, and in no less than thirty-three instances homonymous field defects were found. The commonest defect was a homonymous upper quadrantic hemianopia, often most extensive in the homolateral eye. In the later stages a complete hemianopia was sometimes found. Heretofore, the so-called "uncinate attacks" or "dreamy states," to use the phrase employed by Jackson, their discoverer, have been regarded as the most characteristic focal symptom (Bramwell, Kennedy). However, in Cushing's series, these were present in but twenty-four cases. Therefore field defects are the most frequent and sometimes the sole localizing symptom in temporal lobe lesions.

Cushing sums up the complete symptom-complex of temporal lobe tumors as follows: (1) The commonest localizing symptom is homonymous quadrantic defects of the visual fields. (2) The next most frequently observed symptom is the uncinate fit. (3) In twenty cases generalized convulsions were recorded. A single convulsion without aura was the initial symptom in several cases. In general they were few in number in any given case. (4) Visual hallucinations were present in thirteen cases. They differed from the colored lights typical of occipital lobe lesions, and were complex pictured scenes referred to that part of the visual field found on examination to be defective. They occurred in association with uncinate seizures. (5) In fifteen cases symptoms suggestive of a cerebellar lesion were noted: nystagmus, vertigo, ataxy of movement, and suboccipital headache. The presence of the characteristic visual field defects rendered error in diagnosis avoidable. In several cases, also, mention is made in the paper of sixth-nerve paralysis. It

appears that cerebellar and occipital lobe lesions are those most likely to be diagnosed in error when a temporal lobe lesion is actually present, but, as is clear from the above summary, a correct differentiation should be possible. Cushing concludes that "perimetry gives us information of paramount diagnostic value, particularly in the early recognition of temporal lobe tumors, the partial field defects short of a hemianopia being especially characteristic of involvement of the optic radiation in this region." Like all Cushing's papers, the present one is fully documented and is accompanied by an admirable series of perimeter charts. [Walshe, Med. Sc.]

Riddoch, G., and Buzzard, E. Farquhar. REFLEX MOVEMENTS AND POSTURAL REACTIONS IN QUADRIPLÉGIA AND HEMIPLEGIA, WITH ESPECIAL REFERENCE TO THOSE OF THE UPPER LIMB. [Brain, 1921, XLIV, 397.]

In this important and interesting paper the authors carry a step further the physiological analysis of the reflex movements and postural reactions seen in man in disease of the central nervous system. The material upon which their observations and conclusions are based consists of five cases of spastic quadriplegia from high spinal lesions and of cases of hemiplegia. In respect of the lower limbs they break no new ground, but they give a full description and analysis of certain reflex movements of the upper limbs, which, although mentioned by various authors (notably Magnus, Arch. f. d. ges. Physiol., 1922, CXLV, 455), have never been thoroughly studied. In addition, they discuss at great length the nature of the associated movements familiar in cases of hemiplegia, and, as far as we can follow their argument, appear to draw an important distinction between the processes governing voluntary and reflex movements and those concerned in the production of tonic or postural reactions.

Reflex Movements of the Upper Limb.—In spinal quadriplegia the upper limb is spastic in extension and is held adducted and internally rotated at the shoulder, extended at the elbow and wrist, and with the forearm pronated. In these circumstances one or both of two forms of reflex movement can be elicited by appropriate stimulation. The usual response is the *extension reflex of the upper limb*, which consists in retraction, adduction, and internal rotation at the shoulder, extension at the elbow, full pronation at the forearm, with slight flexion at the wrist and extension of the digits. The receptive field for this reaction appears to include the skin and deep structures of the greater part of the reacting limb. The threshold of stimulation appears lowest on the palm, inner aspect of the arm, and in the axilla. Stimulation of the dorsum of the hand is without effect, but the skin over the thorax from third to sixth ribs gives the characteristic response. The form of stimulus essential is one having a harmful or unpleasant character, such as pinching skin or deep structures, or scratching of the skin with a pin. A certain prolonga-

tion of stimulation also seems necessary. In hemiplegia, as is known, the upper limb is spastic in flexion, and in these circumstances a flexion reflex of the upper limb is obtained from stimuli applied to the same receptive field as that described in the case of the extension reflex. Here, however, the focus of the field is on the palm, and not in the axilla. The response consists in a movement of abduction and external rotation at shoulder and of flexion at all the distal joints. This response was also obtainable, in addition to the extension reflex, from two cases of quadriplegia. In both instances there is a tendency to a wide irradiation of muscular reaction to other parts of the body, and the authors trace the direction in which this occurs most freely. In general it may be said that reflex movement of the upper limb is more facile and more ample in the case of quadriplegia than in that of hemiplegia.

Riddoch and Buzzard agree that the associated movements of hemiplegia and quadriplegia are postural reactions such as were briefly described in *Medical Science*, 1922, V, 510. It is in their chapter dealing with the question of reciprocal innervation in movements and in postural reactions that we find it most difficult to follow or agree with the hypothesis of the authors. We gather that they attempt to establish a distinction between the coördination of movements on the one hand, and that of posture on the other. This distinction has not been found to obtain in experimental studies, and we believe that Riddoch and Buzzard have misunderstood the facts of clinical observation in suggesting that it exists in man.

In dealing with this complex problem it is essential to be quite clear as to what are the teachings of experimental physiology. As Sherrington has pointed out (*Quart. J. Exper. Physiol.*, 1913, VI, 251), the conditions under which experimental investigation of reflex coördination are carried out are infinitely simpler than any conditions existing in the normal circumstances of life. In the former case we have a single stimulus reaching an animal with its whole musculature quiescent, and in the simple reflex reaction which results there is undoubtedly excitation of the prime movers which carry out the reaction, with reciprocal inhibition of the antagonist muscle groups. Certain other muscles which help to fix the reacting limb in an appropriate position, or to prevent a double and conflicting action of the prime movers when these are double joint muscles, are also excited to contract. These are called synergists. Hence prime movers and synergists are said to be "identically" innervated, and the antagonists are "reciprocally" innervated. But it is clear that in normal circumstances a constant inflow of conflicting stimuli reaches the reflex centers, so that each of these is at any given moment under a twofold influence, one element exciting it to discharge and another inhibiting its activity. Out of this seeming disorder it is the function of the nervous system to achieve perfect coördination, and this is done by what Sherrington has called "double reciprocal innervation." If two stimuli of

conflicting character acting upon a reflex center be very unequal in intensity, the less intense is completely suppressed, but if they be approximately equal the result is an algebraical summation of effect. The prime mover contracts or takes up a posture, but with less force than it would otherwise have done were no inhibitory influence at work, while the antagonists show a lessening of contraction or take up a posture at a greater length of the muscle in proportion to the sum of the two effects. In other words, both members of an antagonist pair are normally in movement or in postural contraction simultaneously.

In this connection, Sherrington (loc. cit.) says: "It is sometimes assumed that under reciprocal innervation two antagonist muscles necessarily can never be in contraction at the same time . . . this need not be the case. . . . Not infrequently the antagonists are concurrently in contraction, and their centers concurrently discharging. What reciprocal innervation does provide is that, in the execution of a muscular act by antagonists, augmentation of contraction or motor discharge shall not occur concurrently in protagonist and antagonist, nor, conversely, decrease of contraction or discharge. . . ." In other words, concurrent innervation is equally characteristic of both movement and postural reaction, and further, the term "reciprocal innervation" is wholly applicable to the processes underlying both. It seems that Riddoch and Buzzard have used the word "concurrent" as synonymous with "identical" in this connection. In this respect and in that of their suggested differentiation between movement and posture we believe that a fallacy has crept into their conclusions. Nevertheless, it is their merit to have drawn attention to the fact that simple reciprocal innervation does not comprehend all the complex muscular acts occurring in the living state, a point somewhat neglected by earlier clinical writers on the subject. Moreover, quite apart from the theoretical considerations it contains, Riddoch and Buzzard's paper describes reflex phenomena of considerable interest, and it may be hoped that the authors will publish elsewhere a more concise account of these for the benefit of those who have not access to the original, or who find its length and complexity too formidable an obstacle to careful study. [F. M. R. Walshe, Med. Sc.]

Weed, L. H., and Hughson, W. (1). SYSTEMIC EFFECTS OF THE INTRAVENOUS INJECTION OF SOLUTIONS OF VARIOUS CONCENTRATIONS, WITH ESPECIAL REFERENCE TO THE CEREBROSPINAL FLUID. [Am. J. Physiol., 1921, LVIII, 53.]

Weed, L. H., and Hughson, W. (3). INTRACRANIAL VENOUS PRESSURE AND CEREBROSPINAL FLUID PRESSURE AS AFFECTED BY THE INTRAVENOUS INJECTIONS OF SOLUTIONS OF VARIOUS CONCENTRATIONS. [Am. J. Physiol., 1921, LVIII, 101.]

The earlier work of Weed, McKibben, and others on this subject has already been reviewed in *Medical Science* (1921, IV, 535). From the experiments recorded in their first paper, Weed and Hughson conclude

that the intravenous injection of large amounts of Ringer's solution causes a temporary rise in the cerebrospinal and venous pressures with a rapid return to normal. The arterial pressure is slightly reduced below normal. With a hypotonic solution (distilled water) there is a prolonged increase of the cerebrospinal fluid pressure, and a smaller and more transient increase in the venous pressure. Arterial pressure responds by a slight rise. Strongly hypertonic solutions (30 per cent salt in Ringer) cause a prolonged and profound fall in cerebrospinal fluid pressure preceded by a sharp initial rise. There is also an initial rise of venous pressure followed by a rapid fall to just below normal. The arterial pressure, on the other hand, after an initial fall, rises to just above the initial pressure. The cerebrospinal fluid pressure is constantly above that in the veins, except after injections of hypertonic solutions. The changes in the cerebrospinal fluid pressure seem in large measure independent of the venous and arterial pressures. (2) Unless the skull be opened before injection, it is not possible to obtain negative cerebrospinal fluid pressures by injection of hypertonic solutions. Therefore the bony encasement of the central nervous system may be regarded as a rigid container. (3) In the third paper they record observations confirming their view that alterations in the cerebrospinal fluid are largely independent of variations in systemic venous and arterial pressures. [F. M. R. Walshe, Med. Sc.]

Walshe, F. M. R. ON DISORDERS OF MOVEMENT RESULTING FROM LOSS OF POSTURAL TONE, WITH SPECIAL REFERENCE TO CEREBELLAR ATAXY. [Brain, 1921, XLIV, 539; Med. Sc.]

In a recent review in *Medical Science* (1921, V, 134) the writer of the paper now under notice drew attention to the fact that the many descriptions and interpretations of the cerebellar symptom-complex to be found in clinical literature were for the most part mutually conflicting and were all empirical and incomplete, and that no final analysis on physiological principles had been formulated. In the present paper such an analysis is attempted, and the conclusion is reached that in loss or impairment of postural tone, as this has been described by Sherrington, is to be found a satisfactory explanation of all the defect symptoms arising from lesions of the cerebellum in man. In other words, atonia is the sole and fundamental cerebellar defect symptom. The term tone is used strictly in the sense defined by Sherrington, namely, as a tonic proprioceptive reflex act, the purpose of which is the maintenance of posture. The experimentally observed results of loss of this tone are described in detail, and their identity with the commonly described symptoms of cerebellar lesions in man indicated. In short, a unit formula for cerebellar ataxy is proposed. The characters and limitations of the spinal component of tone are described, and the confusion and vagueness of the common clinical conception of tone are indicated as the cause of the complexity and contradiction of the various theories of cerebellar symptomatology and function. The strikingly different results of cerebellar extirpation in otherwise

intact animals on the one hand and in decerebrate preparations on the other are discussed in the light of Magnus's recent work, and it is concluded that, while the cerebellum cannot be said to be an essential center for proprioceptive tonic reactions, yet it may be the subordinate organ through which the cerebral motor cortex influences postural reactions and coördinates these with the various phasic motor activities of the organism. [Author's abstract.]

Schuster, J. A CASE OF MULTIPLE SCLEROSIS, WITH A POSITIVE SPIROCHAETE FINDING. [Ztschr. f. d. ges. Neurol. u. Psychiat., 1921, LXXIII, 433.]

In a clinically diagnosed case of disseminated sclerosis, which proved fatal within a year of onset, Schuster was able to find spirochaetes in no less than six blocks of tissues out of the several hundred he examined. The lesions in which they were observed were fresh lesions, so small as scarcely to be visible to the naked eye. In larger lesions his observations were uniformly negative. In each case the organism was in the immediate vicinity of a blood vessel. He concludes that it is only in these minute commencing lesions that we can look with any prospect of discovering the organism. In his case spirochaetes were found in the cerebral cortex and at the margin of cortex and subjacent gray matter. [F. M. R. Walshe, Med. Sc.]

Fabricius-Möller, J. MALIGNANT CHORDOMA. [Hospitalstidende, 1919, p. 849.]

This clinical report of a case of malignant chordoma with extension into the pharynx which interfered with the sixteen-year-old boy's breathing. Investigation showed a marked swelling in the upper posterior pharyngeal space reaching to the pillars of the fauces. The swelling was hard. On incision mucogelatinous masses could be removed by scraping. Fibromyxomatous structure showed under microscopical examination. There were no signs of brain involvement as in the case of Jelliffe and Larkin which also extended into the pharynx. After four years recurrence. The palate was split and a radical enucleation done. Microscopical findings of malignant chordoma.

Sherrington, C. S., and Leyton, A. S. EXCITABLE CORTEX OF THE CHIMPANZEE, ORANG-UTAN, AND GORILLA. [Quart. J. Exper. Physiol., 1917, XI, 135.]

This important paper contains a more detailed account of Sherrington and Leyton's investigations on the "motor cortex" of anthropoids than was given in their well-known preliminary papers of 1901-2. It embodies the results of the examination of the excitable cortex of twenty-two chimpanzees, three oranges, and three gorillas. A paper so full of the most significant observations and containing so many richly suggestive conclusions is not readily reviewed and should be consulted in the original.

Read in conjunction with Head's work upon sensation and the cerebral cortex (*Brain*, 1918, XLI, 57), it forms a signal advance in our knowledge of the physiology of the cerebral cortex, reached by converging lines of investigation, while, regarded purely from the point of view of the clinician, it throws much valuable light upon the phenomena of cerebral paralyses in man. The excitable motor cortex (*precentralis motor field*) in the three species of anthropoid examined embraces the free surface and a large part of the sulcal or buried surface of the ascending frontal convolution. The area thus delimited by faradic stimulation corresponds with Campbell's histologically differentiated precentral cortex. While its posterior limits are sharply defined by the fissure of Rolando, its interior border is not thus sharply defined and is a function of several physiological factors to be mentioned. The responses obtained by stimulation show a characteristic instability, which is due to the physiological state at the moment of stimulation of the point under investigation. This in its turn depends on the facilitating influence of immediately precurrent stimulations of this or of adjacent points. Thus there are seen under various circumstances facilitation, deviation, or even reversal of the response first obtained. In addition to this physiological variation, there are fine differences of minute localization from hemisphere to hemisphere in the same individual, and also from one individual to another. The post-central convolution is inexcitable even to strong stimulation, though closely preceding stimulation of the motor cortex at the same level often gives rise to an "echo response" on subsequent stimulation of the post-central convolution.

Eye-opening and eye-ball movements are not represented in the precentral field as primary movements, but can be elicited from a considerable area of the posterior ends of the second and third frontal convolutions, and also from the occipital pole. In both these situations the movements are slower and more deliberate than typical precentral field responses, require stronger stimuli, and can be obtained from a series of discontinuous spots only. The responses are bilaterally symmetrical, in which respect also they differ from precentral field responses, and consist as far as eye-ball movements are concerned in conjugate deviation to the opposite side, with occasional convergence.

Bilateral symmetry of response from the motor cortex proper is exceptional, and even jaw movements are unilateral.

Paralyses resulting from localized ablations of the excitable cortex. By the excision of carefully delimited areas of the motor cortex, complete and segmental monoplegias and hemiplegia were produced. The striking feature of the two former is their ephemeral nature and the incomplete degree of the initial paralysis. Six weeks usually sufficed to produce complete recovery, even of fine movements. Successive ablation of the corresponding post-central and the crossed motor cortex showed that the restoration of function was not due to taking over of function by these

parts of the cortex. As to the mechanism of recovery Sherrington is silent.

It is of considerable interest to clinical neurologists that after the ablation of a given area of motor cortex, certain movements previously innervated from this area are unobtainable as primary movements. However, stimulation of intact motor cortex immediately adjacent to the excised area will still evoke these as secondary movements. The occurrence of voluntary synergic movement in muscles no longer capable of acting as prime mover is a familiar phenomenon in cortical paralyses and is presumably akin in origin to this experimental finding.

A study of the resulting pyramidal tract degenerations by the Marchi method shows a rough functional topography of the pyramidal fibers in cerebral peduncle, pons, and even in the cord, though in the two latter there is much overlapping. From peduncle downwards into the cord the leg fibers appear to lie laterally to those of the upper limb. A point of some therapeutic interest is that the application of local warmth or cold to the scalp rapidly affects the temperature of the subjacent cortex over a range of as much as 10° F.

The function of the motor cortex. As to the nature of the response obtained by stimulation of the motor cortex, Sherrington and Leyton find that an enormous number of localized, isolated, and perfectly coördinated movements are obtained. They appear to be fractional parts of larger movement complexes, and their purpose is readily seen when they are compounded into these more ample movements. It seems as though the motor cortex can synthesize an infinite number of purposive movements from these constituent elements and the authors conclude that "the motor cortex is *par excellence* a synthetic organ for motor acts." It selects, breaks up, and combines the various simpler movements represented in the bulbospinal motor mechanisms and is therefore both an analytic and synthetic mechanism; it is "an organ for synthesis of movement—and postures—on a vast scale."

As a general conclusion from their ablation experiments, Sherrington and Leyton consider that the animals showed a normal forerunning idea of the movement intended, and this appeared to be developed as easily and definitely as before the production of paralysis. The animal's surprise and unfulfilled expectation when the limb failed to act normally indicates "a defect in motor execution rather than in the mental execution of the act, raising the question whether the function of the part of the cortex ablated in such cases be not indeed infra-mental." [F. M. R. Walshe, Med. Sc.]

7. EPILEPSIES.

Pagniez, P. NATURE OF EPILEPSY. [*Presse Médicale*, July, 1921, XXIX, No. 59.]

The author on the basis of personal experience and study of literature supports the assumption that the immediate cause of the epileptic phenomena is a vasomotor disturbance. A protein therapy can then influence this. Intercurrent febrile disease may suspend the seizures. He therefore argues there is some humoral element involved. This, he says, can be modified by diet and by protein therapy. He makes the interesting observation that epilepsy is not a nervous disease but should be classed with gout. The latest notions regarding gout showing an essential element is a disturbance of the vegetative nervous system.

Voncken. TRAUMATIC EPILEPSY. [*Arch. méd. belges*, August, 1921.]

This paper deals with some observations upon four patients. From these the author discusses and concludes that the symptoms are not always due to a localized irritation of the Rolandic area. A neuropathic personal or family history is not a necessary antecedent. There is a great variety in the date of appearance of the convulsive attacks; the first symptoms may develop as late as eighteen months after the trauma. In addition to the ordinary lesions which constitute the direct cause of convulsive attacks, such as splinters of bone, foreign bodies, localized infection, and adherent scars, the existence of traumatic cysts which may be single or multiple must be taken into consideration. When the cranial and cerebral lesions are not definitely localized and the X-rays do not show the presence of a foreign body or cranial irregularity, operation is contra-indicated; on the other hand, a definitely localized cranial or cerebral lesion justifies operation. Operations, if necessary, are preferably to be done under anesthesia rather than with chloroform or ether.

Antheaume, A., and Trepsat, L. PATHOGENESIS OF THE EPILEPTIC CRISIS. [*L'Encephale*, February, 1922.]

The causes of essential epilepsy are still unknown in spite of the extensive research work which was done in recent years, and this important pathological problem is undoubtedly far away from its final solution. Yet the present day tendencies have opened an altogether new way for laboratory investigations, and, as Ph. Pagniez has indicated in an interesting general review, "they lead us to disregard the rôle of the nervous cell element in the paroxysms of the epileptic malady and to consider epilepsy rather as a malady of humoral origin in the same way as we regard migraine and gout." We believe, therefore, that a report on the research work in this field which we did in the year 1913, although belated, might not be without interest. Starting out with the hypothesis that epilepsy is a humoral malady of the anaphylactic type, we were

prompted to search among the organic fluids of an epileptic such a fluid which was capable to provoke a typical anaphylactic crisis in the rabbit.

The patient whom we have chosen for our experiments was a young man twenty-eight years old, suffering from epilepsy since the age of eleven years. His father was luetic. His paternal grandmother died insane. In his early childhood the patient suffered from convulsions; after that his development seemed to be normal until the time when first epileptic crisis occurred. From that date on his intelligence developed very little; he had two or three epileptic attacks daily. Before starting our experiments we thought it useful to suppress all bromide medication, and we put the patient on a severe diet for two months; he was given frequent purgatives and lactic ferments. In the first series of investigations the urine of the patient was collected after the crisis, and then again an hour later through catheterization. Five cubic centimeters of each specimen were injected in the marginal veins of two rabbits. After three weeks the same rabbits received, as above, equal injections of urine collected from the patient before and after the crisis. This did not seem to have any ill effects on the rabbits. The same method of experimenting was repeated while spinal fluid was used instead of the urine. The spinal fluid was obtained through a lumbar puncture done at the time when the convulsions became sufficiently weak so as to permit this little operation. The result of the experiment was the same as with the urine. We did not obtain any different results when the experiment was again tried with the saliva of the patient.

The study of the blood serum was the subject of our last experiment. But here a difficulty arose: the blood serum of the healthy human being is toxic when injected in the blood of an animal and produces a sensibilization outside of any pathological condition; therefore it was reasonable to expect that an anaphylactic crisis might be provoked with the serum of an epileptic patient as well as with the serum of any other human. We found it necessary, in the first place, to arrive at an exact dosage of the serum which may be injected into the blood of a prepared animal without causing a too violent anaphylactic shock; further, to compare the results obtained, on the one hand, by using certain well-defined doses of blood serum of the normal individual, and, on the other hand, by using the same doses of blood serum of an epileptic. According to our investigations, half a cubic centimeter of normal blood serum is a provocative dose, and will produce in the prepared rabbit only a moderate reaction. With this experimental result on hand, we have made six series of injections, using the method as indicated above, and we have employed the serum of our epileptic, the puncture being made in the arm at the moment when the clonic movements began to slow down. In five cases out of six the prepared rabbit was taken with violent convulsive movements which were rapidly followed by death, while the control rabbit, injected in the same manner with blood serum of a nonepileptic, experienced only a slight malaise lasting a few seconds.

It appears, therefore, that, at least in certain cases, the epileptic crisis presents the characteristics of anaphylaxis. We would recommend that these experiments should be repeated under better conditions and on a larger scale. The magnificent researches of F. Widal and his assistants on the hemoclastic crisis must incite the alienists to study by the new laboratory methods the condition of the fluids in all the insane with a dysequilibrium of the grand sympathetic system, who come under their treatment, and particularly in the epileptics who seem to present the maximum of such disorders. [N. Fialko, New York.]

Etienne and Richard. POLYGLANDULAR SYNDROME WITH TARDY EPILEPSY. [Bull. de la Soc. Méd. des Hôpit., January 30, 1920.]

The relationships accidental or essential between epileptiform appearances and endocrine disorder are here further discussed. The authors record a third case of endocrine insufficiency accompanying epilepsy. Notable improvement under thyroid plus ovarian treatment is related. Seizures stopped after therapy was begun. Epileptic equivalents were observed at each menstrual period for two or three months. The phenomena lent support to the assumption that the disturbance was of vascular origin, spasm of the arteries explaining the symptoms. Insufficient functioning of both the thyroid and ovaries are assumed to lie behind this vascular instability.

Klessens. ONSET OF EPILEPSY. [Nederl. Tijdschr. v. Geneesk., November 6, 1920.]

An interesting study at trying to correlate certain epileptic types with definite age incidence. Statistical summary seems to show that epilepsy commences most frequently in the first, sixth, and twelfth years. Some observers have also noted a slight increase of frequency at the eighteenth year. On the other hand, there is a considerably smaller number of cases beginning in the fourth year, and the diminution after the eighteenth year is very pronounced. While symptomatic epilepsy regularly declines in frequency after the first year, the diminution in the frequency of the genuine form is more marked after the sixth year, and still more so after the eleventh year. Klessens suggests that the difference in the time of onset may help to distinguish genuine from symptomatic epilepsy.

Bisgaard, A., and Norvig. BLOOD NEUTRALITY IN EPILEPSY. [Hosptalstidende, January 28, 1920; J. A. M. A.]

Bisgaard and Norvig have been conducting research on sixteen epileptics in an institution, with comparative research on healthy persons—a total of several thousand investigations of blood and urine. They found a most remarkable increase in the ammonia content of the blood about three hours before an epileptic seizure or an epileptic psychic equivalent. Their charts show, as they say, “actually colossal” fluctuations in the ammonia content at these times. They were able to detect them by con-

trol of the ammonia content of the urine; when this began to go up they examined the blood, and thus happened on the pre-seizure rise. They applied the van Slyke, Cullen, Folin, Kjeldahl, and Hasselbach technics in their study of blood and urine, hydrogen ions, etc. Their discovery of the increase in the ammonia of the blood in the psychic-epileptic status is, they say, the first well-defined endogenous toxic substance yet demonstrated in connection with psychoses. The epileptic seizure seems to be a kind of anaphylactic shock or poisoning with albumin waste products. One man weighing 65 kg. had an amount of ammonia in the blood, just before a seizure, corresponding to 32 c.c. of normal solution of ammonia: that is, of a 1.7 per cent solution. Besides ammonia, other toxic elements may be at work, but they are not able to bring on the seizure until the ammonia reaches a certain concentration in the blood.

Bisgaard and Norvig conclude their extensive report with arguments to sustain the analogy between tetany and epilepsy, and their possible common etiology from deficiency in the parathyroid glands. The anamnesis of epileptics needs revision, and the treatment, instead of being merely with sedatives to reduce reflex action, may advantageously attack the endocrine disturbance presumably responsible. The attempts published to date in this line have not been encouraging except with auto-transplantation. Possibly the differences between donor and recipient may have interfered with the success of homotransplantation.

Redlich, E. SENILE EPILEPSEY, ESPECIALLY ITS RELATIONS TO SENILE DEMENTIA AND THE SO-CALLED ALZHEIMER'S DISEASE. [Allg. Zschr. f. Psych., Vol. LXXVI.]

Epilepsy may appear first in the senium. This is comparatively frequently true in cases of the Alzheimer type (with specific changes of the neurofibrillae). The relationship does not lie, it is true, in the presence of this alteration, but in the appearance of the so-called senile plaques relatively often bound with this. The chief localization of the fibrillary conditions as of the plaques shows the difference from the usual senile dementia and Fischer's presbyophrenic dementia. The localization is not in the frontal brain but in the temporal or occipital lobes, but particularly in the horn of Ammon, the relations of which to epilepsy have indeed not yet been explained, but which are beyond doubt. Close investigation of the horn of Ammon is therefore demanded in the future in cases of senile epilepsy even without senile dementia.

Amantea. EXPERIMENTAL EPILEPSY. [Policlinico, December, 1920, XXVII, No. 12.]

An experimental research chiefly on dogs. Epileptic phenomena could be elicited in these animals directly and indirectly by irritating from the periphery the corresponding region of the skin after the animals had been strychninized. The reflex-eliciting zone of the skin thus becomes an epileptic phenomena-eliciting zone. These phenomena start always in

the group of muscles corresponding to the strychninized nerve centers. After cauterization of the nerve centers involved, the epileptic phenomena cannot be induced. The participation of the cortex in the epileptic attack seems therefore certain. By means of a disc of blotting paper, dipped in a 1 per cent solution of strychnin or other chemical, and applied directly to the center for the extensor muscles of the paw or fingers, the efficacy and adequacy of stimuli for sensory nerves in the internal organs and in the organs of sense can be studied, and the inhibiting action of afferent stimuli along with or consecutive to the epileptogenous ones observed.

Novick, N. ALBUMINURIA IN EPILEPTICS FOLLOWING SEIZURES. [Am. Arch. Neur. & Psych., November, 1920.]

In this series of sixty cases studied 66 per cent show albuminuria with granular casts after each epileptic seizure with convulsions. Two patients diagnosed as hysteria showed no albumin or casts in the urine following seizures.

Labbé, M. EPILEPSY AND DIABETES. [Paris Med., May 1, 1920, X, No. 18.]

The author here maintains that in diabetes the seizures are due to acidosis. This worked out in four of his cases. Acidosis without uremia or any other intoxication is accompanied by epileptiform seizures. Localized or general attacks occur and are followed by transitory or prolonged loss of consciousness. They may precede coma or appear after the diabetic coma has begun, or may follow the coma.

Husler. EPILEPSY IN CHILDREN. [Zeitschrift für Kinder., September, 1920, XXVI, No. 5; J. A. M. A.]

Husler reports research in forty-four cases of genuine epilepsy in children. Nearly a third died before they had reached their twentieth year. The graver forms of epilepsy seemed to affect children with signs of degeneracy. In a few cases a decompressive operation on the brain improved conditions materially, although no signs of high blood pressure in the cerebrospinal fluid were detected. The seizures gradually subsided in one boy of seven with grave seizures for a year before the operation, and he is now twenty years old and normal, with no trace of epilepsy. Unfortunately, the decompressive operation was not always so successful, and some imbecile children succumbed to operative shock.

Litwer, H. ATTENTION IN EPILEPSY. [Nederland. Tijdschr. voor Geneeskunde, September 17, 1921, LXV, p. 1506.]

Litwer reports the results of his studies on the diagnostic value of the determination of attention in epilepsy. Wiersma showed by the method of minimal stimuli that epileptics give much greater fluctuations of concentration of attention than normal persons. Godefroy examined the question by a simple method, the so-called "dot-method" test. He found that anomalous dispersion is the most striking and almost constantly

occurring phenomenon in epilepsy; in slight and in early cases of hysteria the dispersion was normal, provided the psychical state was quiet and the patient willing to perform the test; he concluded that abnormal dispersion points to epilepsy. Litwer has applied the "dot-test" in doubtful and in slight and beginning cases where it was not at first sight clear that epilepsy was present or not. He concludes that this test is of no value in the diagnosis of commencing, or slight, or doubtful cases of epilepsy. He explains the differences between his results and Godefroy's by the fact that his own cases were very slight ones with little or no psychical abnormalities, while those of Godefroy were almost all farther advanced ones with greater psychical defects. [Leonard J. Kidd, London, England.]

Carver, A. EPILEPSY FROM PSYCHOLOGIC STANDPOINT. [British Med. Journ., November 19, 1921, II, No. 3177.]

This author upholds the more modern dynamic attitude towards this protean syndrome. It is a syndrome conditioned by a multiplicity of factors. Each epileptic personality requires intensive individual study. He holds that in a majority of epileptics psychologic factors are the most important. For therapeutic reasons these must be understood.

Lowenstein, Paul S. PITUITARY AND EPILEPSY. [Am. Jour. of the Med. Sc., January, 1922, Vol. CLXIII, No. 1, p. 120.]

Every epileptic coming to the Washington University Dispensary, St. Louis, and remaining under observation for a minimal period of three months, was carefully investigated according to a routine procedure which included history and physical examination, mental tests, Wassermann reactions, examination of fundus and vision, visual fields, roentgen-ray plates of skull, etc. After a number of experiments had shown two preparations of the pituitary gland (one an extract of the posterior lobe, the other of the whole gland) to be more constant in strength than the other commercial products, either was administered hypodermically for varying periods after all other medication had been withdrawn. In a few instances the desiccated whole gland was given by mouth. The number of ensuing attacks, the amount of pituitary substance administered, and the body weight were carefully followed and correlated on charts. After a summary of the cases, the findings and results of treatment were analyzed. The symptoms or physical signs referable to the hypophysis, abnormalities in the mental reactions, fundus changes, and general health were briefly outlined. The writer agrees with those investigators who claim that roentgenographically and anatomically there are no characteristic changes to be seen in the sella turcica of epileptics, and points out that eight cases (50 per cent) in his series showed sellar changes, but that only three improved under pituitary treatment, while two patients who had unquestioned evidence of pituitary disturbance, and who did well under the gland administration, had roentgenographically normal sellae.

Exception is taken to the views of certain writers that these "pituitary epilepsies" are due to pressure against the uncinate gyrus, for were it true it would seem rational to anticipate evidence of similar and coincident pressure on one or both of the optic nerves, probably at the chiasm, but the low incidence of changes in the fundi or visual fields, as found in this and other studies of epilepsy, would militate against such a hypothesis.

The weight curves presented wide variations, irrespective of the type of product employed, the increase or diminution in the number of attacks, and without any dietary change by the patient. As a matter of fact there was a slightly lower average gain by the cases that improved than in the unimproved patients. Contrary to the theory that "good results with pituitary feeding need be expected only when the patient has some clinical evidence of hypopituitarism," it was demonstrated that of the five cases that improved definitely under treatment, but two showed evidence of hypopituitarism. The number and character of attacks in the unimproved cases were apparently not influenced by the treatment.

The following conclusions were drawn: (1) Certain cases are apparently benefited by pituitary gland administration; in this series five cases, or 31 per cent. (2) The preferable product seems to be the extract of the whole gland, and the most satisfactory mode of treatment is hypodermically. (3) No cases showing the "typical epileptic constitution" were benefited. (4) There was no improvement in those patients with abnormalities of the fundi or visual fields. (5) Neither physical signs referable to the hypophysis, mental reactions (except the "typical epileptic constitution"), changes in the sella turcica demonstrable by the roentgen ray, nor variations in the weight or health offered any criteria by which the relative degree of success or failure of the treatment could be predicted. [Author's abstract.]

Vining, C. W. BILIOUS ATTACKS AND EPILEPSY. [Lancet, January 21, 1922, I, No. 5134.]

The author here, under the term of bilious attack, discusses the old problem of the relations of migraine to epilepsy. The recognition, therefore, of the possible relationship of these phenomena to the epileptic state and their active and prolonged treatment, together with suitable control of the child's life, may go a long way in the prevention of the development of the convulsive habit.

Laubry and Bloch. EPILEPTIFORM ATTACKS IN SEROFIBRINOUS PLEURISY. [Paris méd., February 25, 1922.]

A previously healthy man, aged twenty-five, had serofibrinous pleurisy, during which he had an epileptiform attack. The author says such cases are very rare. Roch of Geneva, in 1905, was able to collect only five cases, published by Corazza, Talamon, Camus, Treilhe, and himself, respectively. The development of the attacks, as shown by Roch, is due to inflammatory pleural effusion or even a dry pleurisy having an irritat-

ing action on the nerve terminations. Experimental epilepsy has been produced by Roch, Cordier, and Thiroloix, by injection of an irritating fluid (tincture of iodine or ethyl chloride) into the pleura. The vagus conveys the stimuli to the nerve centers, as is shown by the fact that double vagotomy or injection of morphine prevents the occurrence of the attacks, while section of the phrenic or sympathetic has no effect. Hence the advisability of giving an injection of morphine before performing thoracocentesis.

MacRobert, R., and Feinier, L. EPILEPTIC SEIZURES. [J. A. M. A., February 19, 1921.]

These authors have published the results of their investigation of 165 cases of cerebral tumor carried out for the purpose of ascertaining in what proportion of these cases generalized epileptic seizures occurred. Of the 165 patients operated upon at the Neurological Institute of New York during the past year, generalized epileptic seizures had only occurred in four; in all four cases the tumor was in the temporo-sphenoidal lobe. As an explanation the authors suggest that the slow growth of the tumor gradually causes partial occlusion of the Sylvian branch of the middle cerebral arteries, whose walls are known to be deficient in elastic tissue. This partial occlusion would cause anemia of a large area of the cortex with resultant cortical instability, a well-recognized cause of excitement and irritability.

Beadles, J. N. INFLUENZA (?) ACCOMPANIED BY CONVULSION.

At 3 A.M. on January 26, 1922, I was called to see F. T., a man aged thirty-eight, and found him propped up in bed, unconscious. The history was that he had never had any serious illness, but that for the last three days he had suffered from a cold for which he did not go to bed or give up at all, as his wife was expecting to be confined. He had gone to sleep as usual the previous evening; on waking at 2 A.M. his wife found his face and chest wet with cold sweat, and he did not answer when she spoke to him. He seemed to be choking; with the help of friends he was raised to a sitting position in bed, which eased the breathing. When I saw him his limbs were rigid, the arms were flexed at the elbow, and the fingers bent into the palms of the hands. The pupils were equal and slightly dilated, the eyeballs rolling upwards on raising the upper eyelid. There was slight gritting of the teeth, but the tongue was not bitten; respirations were slow but not stertorous, and the face was cyanosed; the temperature was normal. He remained in this condition for four hours, when the rigidity gradually passed off and consciousness returned. At 10 A.M. the only sign of meningeal irritation—supposing that to be the pathological factor—was a certain amount of slowness in speech and perception. There was no paralysis, and recovery was rapid and complete.

Incidentally the shock caused his wife to be so deaf for a time that she did not hear unless spoken to very loudly, but this condition passed

off in six hours. After the shock she received at 2 A.M. she found no more signs of life in the fetus in utero, and on January 29th was delivered of a full-grown child which had every appearance of having been dead for a few days.

Block. WORMS AND EPILEPSY. [Ga. Med. Asso. Jour., March, 1921, IX, No. 10; J. A. M. A.]

Block feels justified in stating that there is reason to believe that epilepsy when produced by animal parasites may be due to the actual invasion of the brain by the larvae. The theory is, at least, less vague than the other theories, and is supported by the clinical fact that the epilepsy is rarely cured by freeing the intestinal tract of the parasites. The absence of worms or eggs in the stools is not proof of the absence of parasites in other parts of the body. Out of 100 cases of epilepsy in which the stools were examined, 56 were negative, 21 showed ascaris, 17 showed hookworm, 4 showed oxyuris, 1 *Taenia (hymenolepsis) nana*, 1 *Taenia saginata*. This shows 44 per cent of the cases of epilepsy have worms. In 17 of the cases the worms or eggs were present on examination at the time of consultation, while in 27 cases they had been previously found in laboratory examinations or had been seen by the patients and described accurately. Most of the cases of ascaris belonged to this latter group. The work done by the Rockefeller Sanitary Commission showed that out of a total of 35,133 examinations, 11,418 people showed intestinal parasites (32.49 per cent). As part of these were double infections, a total of 11,985 worms were found. Out of the last 1,000 cases examined in the laboratory of the Georgia State Board of Health, 250 showed worms (25 per cent). Out of 1,695 stools examined (some of which were reexaminations of the same patient), 680 stools showed worms (40.12 per cent).

Tucker, Beverley R. CONSIDERATION OF THE CLASSIFICATION OF RECURRENT CONVULSIONS. [Southern Med. J., November, 1921.]

The writer takes up the question of convulsions and believes that the diagnosis of epilepsy should be limited to a small group of truly idiopathic convulsions which are based on the heredity of defective brain conformation which is transmitted from ancestor to descendant. He believes that the use of substances like luminal, which are considered a boon of to-day, may, by inhibiting clinical investigation and scientific research, prove a curse of to-morrow. Recurrent convulsions he believes to be symptomatic as those found in eclampsia, uremia, apoplexy, meningitis, cerebral injury, tumor or abscess, neurosyphilis, cerebral arteriosclerosis, and those occurring at times in acute febrile conditions. In classifying recurrent convulsions he suggests the following groups: (1) the hereditary; (2) toxic or infectious; (3) birth trauma; (4) Jacksonian; (5) intracranial growth; (6) hemorrhage; (7) neurosyphilitic; (8) arteriosclerotic; (9) hypopituitary; (10) variable vascular tension.

The last two groups the author elaborates. He reported in 1914 some cases of epilepsy which he thought had a pituitary basis, and in 1919 he reported and analyzed eleven cases due to transitional hypopituitary states and seventeen cases due to chronic hypopituitary states. In the transitional cases he found that definite improvement occurred on pituitary feeding in eight of the cases. In the seventeen chronic hypopituitary cases he found that nine of them had no attacks for more than three years; in two the attacks were controlled as long as the pituitary was kept up, but returned when it was stopped; in four improvement took place; one was not improved, and one was lost track of.

Tucker describes a group of cases in which the recurrent convulsions make their appearance during middle life, and in which recognizable uremia, neurosyphilis, and cerebral arteriosclerosis have been eliminated. In these cases the urine may or may not show a slight amount of albumin. There is usually a slight increase in urea nitrogen. Repeated blood pressure estimations reveal a very variable blood pressure. The patient considers himself in good health except for the convulsions. He reports twelve of these cases occurring in 500 cases of recurrent convulsions. In some of them the blood pressure varied as much as seventy points between visits, and the attacks varied from three a day to six a year. When the blood pressure became stable, even though high, the attacks usually ceased. Treatment directed toward blood pressure stabilization influenced the attacks beneficially. To this group he gives the name of variable vascular tension recurrent convulsions. [Author's abstract.]

Leriche, R., and Wertheimer, P. JACKSONIAN EPILEPSY. [Lyon Chir., July-August, 1921, XVIII, No. 4.]

Jacksonian epileptic attacks, according to these authors, can be brought on at will in some individuals. Such are predisposed by reducing the pressure in the cerebrospinal fluid or by inducing abnormally high pressure in the same. The pressure in this fluid can be modified by intravenous injection of saline or distilled water. An extreme case is described in which the attacks and the psychic condition were seen to be unmistakably dependent on the state of the pressure, and fluctuated with it, the pressure left to itself being usually subnormal in the girl of seventeen. In another case, in a man of forty, the protrusion of the cicatricial tissue in the skull wound suggested hypertension as responsible for the attacks, and since enough spinal fluid was released to bring the tension to normal, there have been no further attacks, as also in another case.

Peterman, M. G. KETOGENIC DIET IN TREATMENT OF EPILEPSY. [Am. Jl. Diseases Children, July, 1924.]

Seventeen patients were put upon his ketogenic diet. Ten patients had no epileptic fits for some time. In four patients with numerous daily attacks the number was greatly reduced. Four patients were placed on a ketogenic diet with phenobarbital. One of these, with grand mal, has

had no further attacks. Two, with grand mal, and one with grand and petit mal, have only occasional attacks. For comparison, the results of other types of treatment are cited. Forty-three patients received the routine treatment for epilepsy. Fifteen of these patients (ten with grand mal, two with petit mal, and three with grand and petit mal) are greatly improved, and have only occasional attacks. Eleven patients have not responded to treatment. Ten were not heard from.

Kollewijn, J. R. A CASE OF NARCOLEPSY. [*Nederl. Tijdschr. voor Geneeskunde*, June 3, 1922, LXVI, p. 2155.]

By narcolepsy we usually understand a condition of suddenly occurring short attacks of sleep, mostly on a hysterical basis. The patient was a healthy woman, thirty-four, at the sixth month of her fourth pregnancy. She was uncontrollably sleepy by day, but was restless at night, often jumping out of bed. One day, as she kept on putting cents into her mouth, the doctor was sent for. He found her awake, and she looked rather anemic. In a couple of minutes she was asleep, maintaining her sitting position, while her head fell forward. Her temperature on admission was 37.4° C., but soon fell to normal. During examination she is continually falling asleep and waking completely after two minutes. This goes on all day. Her appetite is good, but her constant attacks of sleep keep her from eating much. Urine and thoracico-abdominal organs normal. The only nervous signs are hemihypesthesia, hemihypalgnesia, and catalepsy. After a week's treatment by suggestive measures, which did no good whatever, she was put into cold wet sheets, and in a very short time there was complete recovery from narcolepsy. [Leonard J. Kidd, London, England.]

Meyer, M. PYKNOLEPSY. [*Zeit. für Kind.*, January, 1921, XXVII, Nos. 5-6.]

This paper discusses recurring mild attacks in children. They resemble petit mal. The children finally outgrow them without mental impairment, and none of the usual measures for treatment of epilepsy have any effect. There is a brief, slight disturbance in consciousness for ten or twenty seconds; the eyeballs roll up and the knees may give way. He has had four patients with this pyknolepsy, all girls between seven and twelve, with an inherited nervous taint but no epilepsy in the family, and there was no evidence of spasmophilia. One of the children had up to thirty attacks a day, and slight jerking was noted in one case, and urine sometimes escaped during the attack. The children were bright and lively, with nothing to suggest hysteria. Under treatment with calcium lactate up to 6 gm. a day, with 0.03 to 0.05 gm. phenobarbital six times a day, improvement was observed amounting to a complete cure in three months in one of the cases, but in two of the cases no benefit was apparent. The attacks first appeared as the child began to attend school, and fatigue

may possibly be a factor in their production. The pulse was unstable and the reflexes exaggerated in these pyknoleptic children.

Niccolai, N. POLYCLONIA PLUS EPILEPSY. [Revista Critica di Clin. Med., September, 1921, XXII, No. 26.]

A healthy girl of sixteen, after a fright from an aviator's bomb, developed epileptic seizures. For two or three years clonic spasms and mental confusion were added. The clinical picture was thus the typical one described by Unverricht in 1891 as he first saw it in five children in one family with an alcoholic father. Niccolai compares with his the similar cases on record. It seems probable that according as the morbid stimulus acts suddenly and violently on the predisposed area in the cortex, or slowly and insidiously, epileptic seizures or clonic spasms develop. That it is true epilepsy, however, is demonstrated by the character of the progressive mental impairment.

Crocket, J. TUBERCULIN IN EPILEPSY. [British Med. Jour., March 26, 1921; J. A. M. A.]

Some textbooks on the subject of tuberculin mention epilepsy as a contraindication to its administration. Crocket's experience shows that, so far from that being so, it is a decided indication for its use, especially under two circumstances: (1) the presence of a tuberculous lesion, active or quiescent; (2) a family history of tuberculosis. Six and a half years ago he began to give tuberculin to a patient thirty-two years of age, who had suffered from epilepsy of the major type since the age of seven, and who had a large mass of tuberculous glands below the right ear with several discharging sinuses. In the course of a year and a half the glands disappeared entirely and the pleurisy cleared up. *Pari passu* with the disappearance of the tuberculous lesions, the epileptic fits became fewer, and after two and a half years ceased entirely, and the patient likewise improved mentally. For four years this patient has been free both from tuberculosis and from epilepsy. Encouraged with the results of treatment in this case, about eighteen months ago he began to administer tuberculin to several other epileptics who had no clinically obvious or apparent tuberculosis, but gave a family history of tuberculosis. One of these has responded excellently. Tuberculin was first given to him in November, 1919. For nearly fourteen months he has had no signs of epilepsy, and mentally he has also improved. The records of this case show that previously the patient was pugnacious and irresponsible, but during the past year he has been well behaved and fairly industrious. Five others to whom tuberculin has been given for six to twelve months show a diminution in the number and in the severity of their seizures. Three show no change. We have begun to give tuberculin to a hundred epileptics. The tuberculin used was Burroughs, Wellcome & Co.'s B. E. and P. B. E., mixed in equal parts, and it was given in doses beginning at 0.00000001 c.c., gradually increased to 0.4 c.c. The injections were

given at intervals of seven days to begin with, and later of fourteen days. The treatment has gone on without any intermission. General reactions have been avoided, but once or twice local reactions of a rather severe type occurred when large doses of bacillary emulsion were given. On two occasions cold abscesses formed, which had to be aspirated.

Stier, E. SYNCOPAL ATTACKS. [Deut. med. woch., April 8, 1920, XLVI, Nos. 14-15.]

Stier states that syncopal attacks are to be regarded as the result of abnormally intense oscillations in the blood circulation which rest exclusively on an inherited constitutional inferiority of the neurovascular apparatus. Many of these attacks are of purely reflex origin. As to the mechanism of the process, we may assume that the quick contraction of the cerebral vessels due to emotional disturbances, and the resultant sudden shifting of masses of blood to the internal organs, and more especially to the abdominal organs, which normally is followed by a dilatation of the cerebral vessels, in a syncopal attack become too intense, and the dilatation of the cerebral vessels does not occur in time. The clinical picture, however, requires the recognition of certain psychic factors. Syncopal attacks seldom occur in children under circumstances that endanger their lives—never on the street, when at play, or in swimming, or the like—but almost always at home when help is near. From this fact it is evident that aside from the reflex process in the neurovascular apparatus, psychic factors play a decisive part, among which is weakening of the will power or when the surroundings are such that the child feels that he can yield to the strain. [J. A. M. A.]

Sabrazès, J. GARDENAL (PHENYLMALONYLUREA) IN EPILEPTIC "ABSENCES." [Gaz. Hebd. des Sci. Méd. de Bordeaux, June 19, 1921, p. 293.]

The epileptic "absences," a too little studied form of petit mal, occur sometimes quite independently of any convulsions. Whereas bromides and borax are of little use, Sabrazès finds that these attacks of "absences" are remarkably controlled by gardenal in a dose of 0.10 gm. in half a tumblerful of water at 9 in the evening. The absences disappear entirely while this treatment is kept up, so that the patient becomes euphoric and quite transformed. But if it be stopped the absences return with even greater frequency than before. Its use must therefore be continuous, and the drug has no bad effects on heart or kidneys in a daily dose of ten to fifteen centigrammes. [Leonard J. Kidd, London, England.]

Austin, M. L. USE OF LUMINAL IN EPILEPSY. [Ohio State Medical Journal, October 1, 1921, XVII, No. 10; J. A. M. A.]

Luminal has been used by Austin in one group of forty-nine epileptics for fifteen months, with daily doses of from 1 to 5 grains at bedtime. In cases of status epilepticus and mania, it has been used subcutaneously in doses of from 1.05 to 5 grains (0.1 to 0.3 gm.), or per rectum from

5 to 10 grains (0.3 gm. to 0.6 gm.). As to the results: In some cases the character of major seizures has been replaced by an atypical one, in which there is no tonic or clonic convulsion, but a furor of considerable violence, of irregular body movements, with loss or partial loss of consciousness. In other cases major seizures are controlled or replaced with minor ones in which loss of consciousness is sometimes incomplete. Austin does not herald luminal as a specific in epilepsy. As a matter of fact he cannot believe that it is. But it will ameliorate many cases, and to date has given better results by far in essential epilepsies than any remedy so far used. Those patients who have been on luminal treatment are in as good physical and mental state as at the beginning of the treatment and many much improved. So far no pernicious results are recognized.

Steinthal. SUPRARENAL TREATMENT OF EPILEPSY. [Zentralbl. f. Chir., June 25, 1921; B. M. J.]

This surgeon has attempted to control epileptic fits in seven cases by removal of one suprarenal body. The patients were from fifteen to twenty-nine years old, and only in one case was there a possibility of the origin of the epilepsy being traumatic. In one case in which the fits had occurred three or four times a day before the operation, no fit occurred during the first fifteen days after the operation. In another case the fits returned on the ninth day after the operation, but were slighter than before. In two other cases there was also some improvement, but on the whole the author is inclined to regard this treatment as disappointing. Discussing the three possible reasons for his failures—faulty technique, selection of unsuitable cases, or a misconceived rationale—he is inclined to dismiss the first two, and to suspect that Heinrich Fischer's interesting investigations into the relation of the suprarenal bodies to epilepsy have been misinterpreted in so far as they have been made the foundation for this method of treatment. Sandor (*Ibid.*) has removed a suprarenal body in four cases of epilepsy, but as only three months have elapsed since the first operation, he is diffident as to the permanency of the results achieved. He notes, however, that the immediate results were very promising, and the loss of blood at the operation being very small, the immediate improvement effected could not be traced to blood-letting simply.

Bumpke and Küttner. EXTIRPATION OF SUPRARENALS IN EPILEPSY. [Zentralblatt f. Chirurgie, November 20, 1920.]

These surgeons recommend a different operative technique from Brüning. With laparotomy there is considerable difficulty in locating the suprarenals, whereas from the lumbar region the organs are found without any trouble. They operate on the left side as does Brüning. They describe their technique in detail, but as yet no clinical report upon the results.

Brüning. REMOVAL OF SUPRARENAL GLANDS IN EPILEPSY. [Zent. f. Chir., October 23, 1920, XLVII, No. 43.]

On the basis of an hypothesis suggested by Fischer that reduction of the substance of the suprarenal glands of an animal lessens the tendency to convulsive seizures, this surgeon has tried removing the left suprarenal gland in nine cases of epilepsy. The experiment was not successful in every particular, but an improvement was effected in all cases, and in some instances amounted to a practical cure. Two of the patients were entirely freed from epileptic attacks. The cases that were unsuccessful were perhaps not carefully selected owing to lack of experience. Brüning does not wish to be understood as claiming that all cases of epilepsy can be cured in this manner. He simply regards the operation as pointing to a new method which will make it possible in a certain number of cases to relieve in a measure the main symptoms of epilepsy, the convulsions.

Spleht. EXTIRPATION OF THE SUPRARENALS IN EPILEPSY. [Zentralbl. f. Chir., September 17, 1921.]

This surgeon came to the following conclusions as the result of 200 experiments on animals for the purpose of testing Fischer's claim that epileptic convulsions could be cured by extirpation of the suprarenals: (1) After removal of one suprarenal and of the largest part of the other at the same time, a complete cessation of the convulsions caused by amyl nitrite could not be effected, a prolongation of the interval between the convulsions was only exceptional and by no means a regular occurrence, and the convulsions took place at about the same time, or even earlier than before. (2) After removal of one suprarenal the possibility of the hypertrophy of the other within a short time must be reckoned with, as well as the regeneration or hypertrophy after partial resection, especially of the cortex, which is exactly that part of the suprarenal which, according to Fischer, plays the chief part in the production of convulsions. Lastly, it is probable that the inter-renal system, which is so well developed in man, takes on a vicarious function after a certain time, so that on this account a permanent success could not be expected.

Sándor, S. EXTIRPATION OF SUPRARENAL GLAND IN EPILEPSY. [Zent. f. Chir., June, 1921, XLVIII, No. 25.]

This surgeon reports favorable results in four cases of epilepsy in which he removed one suprarenal gland. The longest interval is only three months, while the other cases are more recent. The results so far are excellent. It remains to be seen how permanent they will be. The first patient operated on had been confined to his bed for several months, and during the three months previous to the operation was not free from attacks for more than half a day at a time. Now (three months after operation) he can walk about actively, although he still has mild attacks about every two weeks. The jerking is confined to his hands and arms. He does not fall down during the attacks. He merely stands still a few

minutes; then walks on. As there was a very slight loss of blood during the operation, the improvement cannot be due to that cause. Sándor thinks that the method is deserving of further trials.

Schmieden and Peiper. SUPRARENALECTOMY IN EPILEPSY. [Arch. f. klin. Chir., November 24, 1921, 118; J. A. M. A.]

No permanent benefit was obtained in seven cases of epilepsy treated by removal of one suprarenal. The patients were from six to twenty-three years old. In one of the women menstruation became irregular and scanty afterward, while in another woman menstruation reappeared, with normal regularity, after suspension for eight years. In both these cases the seizures appeared in connection with the menses. This was evident likewise in another case he cites, in which a favorable influence from the suprarenalectomy was manifest.

Gamberini. TREATMENT OF TRAUMATIC EPILEPSY. [Rif. Med., Dec. 10, 1921, XXXVII, No. 50.]

During the war this surgeon operated in 138 of 652 war wounds of the skull. Epilepsy later developed in 44; 10 of these at an interval of two or three years. Reoperation in 33; 15 of these were cured and 5 materially improved. No benefit was apparent in the remainder. The best results in all his experience were always realized with an autoplasmic operation, turning back over the gap in the skull a bone and periosteum flap from the vicinity, fitting it well into place. The elasticity and yielding nature of the very thin flap insures a safety-valve action.

Tenani, O. OPERATIVE TREATMENT OF JACKSONIAN EPILEPSY. [Poli-clinico, May, 1921, V, No. 28.]

The outcome in five cases of post-traumatic epilepsy in which a plastic operation was performed is here reported. In ten the plastic operation was to close a large defect in the skull. Jacksonian attacks were absent in all after excision of the cicatrix in the meninges and brain, with or without extraction of some sequester or scrap of metal. A flap of costal cartilage proved the best means to close the defect in the skull in these cases, but when there is a very large gap in the skull, with functional disturbances, a skin and bone flap from the vicinity or a bone-periosteum flap or cartilage flap can be used indiscriminately. In the epilepsy cases there is danger from proliferation of bone, so that cartilage is preferable.

Petit, Georges. AN INTERMITTENT PSYCHOÖRGANIC OR ECLIPSING FORM OF EPIDEMIC ENCEPHALITIS. [Presse Médicale, January 4, 1922, p. 8.]

A woman of thirty showed, over a period of fourteen months, a series of multiple psychical and organic symptoms dependent on epidemic encephalitis, viz., precocious Parkinsonism, ocular symptoms, myoclonias, spasmodic laughter and tears, acute delirium, anxiety, akathisia (morbid

fear of sitting down), and hysteriform convulsions. But these symptoms appeared in three separate attacks, each of several weeks' duration. After each attack everything returned to normal, so that recovery seemed to be complete. These intermittent or eclipsing forms of epidemic encephalitis are of importance from pathogenic, prognostic, and therapeutic points of view. [Leonard J. Kidd, London, England.]

Christin, E. THE NEW TREATMENT OF EPILEPSY. [Schweiz. med. Woch., February 3, 1921, p. 111.]

The chloride deprivation method allows of the use of relatively small doses of bromides, so that there is obtained in the organism an equilibrium between the ions Br. and Cl., which diminishes the reflex excitability of the nervous system without clouding it; the sodium bromide is the best form. The combination of bromides with peptones has the inconvenience of the exciting and toxic action of the peptones. Bromural, neuronal, and bromeine are more suited to insomnia and anxious-agitation than to epilepsy. Zinc oxide has been used against the epileptic attacks (some authorities find it useful in small doses in *petit mal*). Bolten has used thyroid and parathyroid extracts. The crotalin treatment is not to be recommended (long ago the Homeopathic School used it in very small doses). Luminal, introduced in 1912 by Bayer, differs from veronal (diethylmalonylurea) by the substitution of a phenyl group for one of the two ethyl groups; its soporific effect is much increased; very good reports have been given of it from many countries. In general, two or three 10 cgm. cachets or tablets are given per diem. It is but little soluble; its sodium salt, very soluble, is used for subcutaneous injections. Sometimes there is at first slight vertigo and headache, and rarely an excited stage. Very quickly the epileptic attacks lessen, and the general state improves, with euphoria, disappearance of mental clouding, and often improved appetite. No bad cardiovascular effects are seen. As a rule, arterial tension is lowered, and the pulse is slowed and steadied. The drug is rapidly eliminated by the kidneys. Only occasionally are eruptions, scarlatiniform or urticarial, seen after months of its use. It has thus great advantage, but its action is suspensive, not curative; after its disuse fits reappear. Kress and Hebold think it is especially indicated in cases frankly epileptic with frequent seizures; it acts more quickly than bromides; but it is of little use in *petit mal*, vertigos, or epileptic equivalents. Jödicke has given it with bromide (2 to 3 grm. of Pot. Brom. with 10-20 cgrm. luminal). Erlenmeyer interrupts an ordinary bromide course by four or five days of luminal treatment, to avoid the bromism. The writer gives 20 to 40 cgrm. of luminal daily at first in bad cases up to the complete suppression of the attacks, and then continues with 10 to 15 cgrm. and a salt-free diet and frequent purgation. Pierre Marie uses at the outset the tetraborate of sodium and then cream of tartar in 3 grm. dose per diem; he finds that the latter quickly lessens the attacks and diminishes the vertigo; it exhilarates and clears the mind.

memory, and attention; children bear it well; and continuous treatment with it does not give dyspepsia. But it is not curative. The writer has found it useful in mild cases, but it appears to be less active than luminal. He concludes that of the new therapeutic treatments of epilepsy only luminal, and possibly cream of tartar (borico-potassic-tartrate), have really enriched our anti-epileptic therapeutic equipment. [Leonard J. Kidd, London, England.]

Voncken, J. OPERATIVE TREATMENT OF JACKSONIAN EPILEPSY. [Arch. Médicales Belges, August, 1921, LXXIV, No. 8; J. A. M. A.]

Four typical cases after war wounds are described, with the operative treatment applied. The results are not very satisfactory. The epilepsy did not develop until eighteen months after the traumatism in one case. Auvray found a subdural cyst in seventy-nine cases; it was above the brain tissue in all but thirty-three. In this latter group a focus of softening was evidently the primary lesion; in the forty-six others there must have been some circumscribed serous arachnoiditis to start with. Voncken's experience has made him very dubious as to the ultimate benefit from operative treatment in cases of jacksonian epilepsy, although healing may proceed smoothly. The attacks may not return for many months—over three years in some of Tuffier's cases, and ten months in a case here reported, and they then returned every month. He remarks in conclusion that simple suture of the skin over the brain lesion seems to be preferred more and more rather than introduction of a foreign substance. De Martel said at a recent meeting: "I am afraid that some confrère may be reading us a few months or years hence a report of 'cases of jacksonian epilepsy aggravated by introduction of a sheet of foreign substance between the dura and the brain.'"

Clark, L. P. THERAPEUTIC SUGGESTIONS IN TREATMENT OF EPILEPSY. [N. Y. State Journ. of Med., January, 1922, XXII, No. 1.]

What this author understands by "essential" epilepsy is an organic disease of the *personality*. It is to be recognized by a series of defects of instinct. Egocentricity, supersensitiveness, and emotional poverty are the chief psychiatric signs. The fit is the maximum periodic manifestation of the disorder; it is a psychic regression phenomenon, a protective release of the mental mechanism from too intense physical and mental stress. The line of treatment is analytical, explanatory, and a broadly reëducative one, physically and mentally.

Stanton, I. M. LUMINAL TREATMENT IN EPILEPSY. [Mich. State Med. Soc. Journ., January, 1922, XXI, No. 1; J. A. M. A.]

One hundred epileptics have been given luminal by Stanton. In practically all cases there has been a diminution in either the number or severity of the seizures, and in many instances the seizures have disappeared. Luminal accompanied by bromides in the early stages of the treatment has given better results than luminal alone.

Murphy, F. D. LUMINAL IN TREATMENT OF EPILEPSY. [Wis. Med. Journ., March, 1922, XX, No. 10.]

Murphy's experience with luminal in sixty-three cases of epilepsy was so satisfactory that he urges further investigation. Some patients were relieved of the attacks entirely and at once, while others were apparently not affected at first but gradually the attacks began to decrease in number and severity until at last they ceased altogether; still others never became free from the seizures. Few patients treated were not benefited to some extent by luminal. [J. A. M. A.]

Wechsler, I. S. TREATMENT OF EPILEPSY. [Medical Record, October, 1921, C, No. 16.]

There are *treatments* for epilepsy; there is no real treatment. No drug is specific because essential epilepsy is not a disease, but a symptom complex of possibly numerous unknown underlying conditions. Fifty-eight true idiopathic cases are discussed. While luminal keeps convulsions in abeyance (eighteen cases) so long as its administration is continued, the attacks return when it is stopped, and in a few instances it appears to aggravate the condition, and it has little effect on petit mal. Bromides are at times still the only drugs which affect epilepsy, and in some cases when both luminal and bromides separately have failed they may be successful in combination, though this is not always the case. The products of the endocrine glands have given good results, especially in females in association with anomalies of menstruation. Certain food-stuffs appear to have a special relation to some of the cases, and in treatment by starvation there seems to be some correlation between the number of convulsions and the height of the induced acidosis. So, too, it may be observed that any one of the well-known methods of treatment, however empiric, may at first help to reduce the number of seizures. Sometimes a drug will act beneficially for a time, then cease to have an effect; the substitution of another drug may then bring about renewed amelioration. Success in treatment frequently results only from persistent effort, and if one drug after another does not help it may be wise to combine several of them to obtain desired results. In some cases at times, gradually increasing doses of the same drug may control the seizures when the smaller doses do not. This is particularly true of luminal, which frequently fails if administered in small quantities and succeeds in larger ones. Finally, there are numerous patients who do not respond to any treatment or combination of treatments even if fortified by rigid dietetic and hygienic regulations.

Hughes. LUMINAL IN EPILEPSY. [Rhode Island Med. Journal, December, 1921, IV, No. 12; J. A. M. A.]

Dizziness, "dopiness," sleepiness, and headache were the most frequent symptoms noted by Hughes and others in the administration of luminal. One month's treatment with luminal of thirty cases of so-called idiopathic

epilepsy seems to show that the seizures have been reduced in number, and in severity. Post-epileptic phenomena seem less marked since the administration of the drug. No serious symptoms which can be directly attributed to the luminal were observed.

Babonneix, L. TREATMENT OF EPILEPSY. [Méd. Paris, February, 1920.]

This author accents hereditary syphilis as the major factor in epileptics. On the least suspicion of it, give specific treatment at once, striking hard and fast and perseveringly.

Maillard, G. TREATMENT OF EPILEPSY. [Bulletin Médical, September, 1921, XXXV, No. 39; J. A. M. A.]

Maillard says of the management and treatment of epilepsy that until quite recently very little progress had been realized in the treatment of epilepsy, but in late years phenobarbital (luminal)—with or without bromides—borico-potassic tartrate, and surgical intervention have realized great progress. He states that phenobarbital seems to be equally effectual against all the manifestations of epilepsy, seizures, absences, psychic disturbance, traumatic and essential epilepsy, localized or general. With the proper doses the epileptic manifestations should disappear by the second day. This is the rule, and this effect serves to exclude hysteric crises, as phenobarbital has no action on these. He adds that the physical and mental condition improves likewise under the drug. For a small person, 10 cgm. morning and 10 cgm. at night are the usual daily dose. Larger persons can take 15 cgm. morning and night; children from ten to fifteen should not take over 10 cgm. a day, and younger children less than this.

Willemse, A. TREATMENT OF GENUINE EPILEPSY BY A COMBINATION OF BORUM PREPARATIONS AND LUMINAL. [Nederlandsch Tijdschr. voor Geneeskunde, June 17, 1922, LXVI, 2407.]

Willemse has treated epileptics by a combination of borium preparations and luminal for a year with most favorable results. He gives four times a day a powder containing 750 mgm. of natrium baborate, 200 mgm. of boric acid, and 25 mgm. of luminal. He has not had any poisonous symptoms nor any drawbacks of importance; twice, however, he saw papulo-vesicular skin eruption over the whole body. In these cases bromides had done but little good. The psychical state was greatly improved by this treatment. The writer admits it is not a specific treatment, but he commends its use as a helpful method of treatment in epileptics. [Leonard J. Kidd, London, England.]

Roubinovitch, J. EPILEPSY. [Bulletin Médical, September, 1921, XXXV, No. 39; J. A. M. A.]

Roubinovitch comments on the unity of epilepsy in all its forms, general or partial, transient or persisting, whatever its origin, reflex, infectious, toxic, or autotoxic. The war experiences, he says, have confirmed this unity, from simple scotoma scintillans to the most complex motor phenomena.

Golla, F. LUMINAL CONTRASTED WITH BROMIDE IN EPILEPSY. [British Med. Journal, August, 1921, II, No. 3164; J. A. M. A.]

A study of the results recorded by Golla shows that 36 out of a total of 125 patients were either not improved or deteriorated under luminal treatment, while the remainder did better under luminal than under bromide. The patients most beneficially affected by luminal were those with fits occurring at frequent intervals, and the patients least affected were those whose fits occurred in bouts at considerable intervals of time. The doses of luminal employed have rarely exceeded six grains a day of the sodium salt. The drug is, as a rule, well tolerated, and most patients found that they were far brighter and more cheerful after a change to luminal from bromide treatment. Twelve patients complained of giddiness and drowsiness. Five of these patients showed definite affection of the gait, reeling slightly as if under the influence of alcohol. By diminishing the dose of luminal, Golla was able to secure eventual toleration in all but four patients, who complained so persistently of giddiness that the luminal treatment was suspended. Urticarial rashes appeared in two cases at the onset of treatment, but disappeared when it had been continued for a few days. There has in no case been any sign of the formation of a drug habit, and suspension of the treatment has never given rise to any disturbance. There is a tendency in all cases for the number of fits to increase slightly after the first two months of treatment.

Bambarén, C. A. EPILEPSY. [Anales de la Fac. de Medicina, Peru, May-June, 1920.]

Bambarén concludes his review of the present conceptions of epilepsy with an appeal for individualization in managing cases of epilepsy according as the brain or the endocrine system is responsible for the disease. The thyroid and parathyroids may be responsible for it directly or only secondarily, in the endocrine group, but in the cerebral group the prinal cause may be infectious, toxic, traumatic, or from physical malformation or tumor growth. He remarks that the Abderhalden reaction has confirmed the cortical site of the cerebral lesion. Treatment should aim to remove the cause and supplement deficient endocrine functioning, with possibly nonspecific antigen therapy. [J. A. M. A.]

Maillard, G. TREATMENT OF EPILEPSY. [Encéphale, July 10, 1920; J. A. M. A.]

This society report states that Maillard described sixteen cases of epilepsy in which systematic treatment with phenylethylbarbituric acid (luminal) was followed by improvement far surpassing any he had witnessed under other measures. He states that the results were "réellement merveilleux." In the discussion that followed, de Fursac cited Ducosté's experience with the drug (dose not over 0.15 gm.). The radical arrest of the seizures was accompanied in some of his patients with certain mental disturbances, violent, impulsive acts, and even delirium. Maillard

noted the same tendency in some, but it was mild and transient. Laignel-Lavastine reported a case in which the drug has been taken for four years, and the formerly violent and frequent seizures have almost completely disappeared, but vertigo and spasms are more frequent than before. Hartenberg's two patients have taken the drug for six or seven years, and have no further seizures, but have become so irritable and irascible that he says it is a question whether they have been really benefited. Claude's four patients have taken the drug for several years and have no further seizures or very slight ones. In one the seizures had been extremely violent, unmodified by bromides and decompressive craniectomy. Maillard's dose was from 0.2 to 0.4 gm. per day for the course. His experience dates only from November, 1919, but he says that it justifies the highest hopes. In one case he increased the dose for two or three days to 0.6 gm. He gives half in the morning and half in the evening, with a hot drink.

Kummer. ROENTGEN-RAY TREATMENT OF EPILEPSY. [Rev. Méd. d. l. Suisse Rom., October, 1920, XL, No. 10.]

Kummer cites data from the records which show that the action of the roentgen rays in epilepsy is neither regular nor constant, benefit in some cases being balanced by negative or frankly bad results in others. He reports a personal case of traumatic epilepsy in a man inclined to abuse of alcohol. The extremely severe seizures had returned about once in two weeks for nine months when Kummer applied radiotherapy, a total of 90 X roentgen units in two series during two months. There were no seizures during the following nine months. Then three new seizures occurred, and another series of roentgen exposures was given to a total of 40 X units. There has been no recurrence since then during the three months to date of writing. After each exposure the man fell into a deep sleep for ten minutes, but then roused and felt well. Bromide is given regularly daily. [J. A. M. A.]

Ducosté, M. EPILEPSY. [Bull. Médical, October, 1921, XXXV, Nos. 40 and 42; J. A. M. A.]

Ducosté considers the *maladie épileptique* from the etiologic, psychiatric, and medicolegal standpoints, and states that one solid conclusion may be drawn from his research on the families of 100 epileptics, namely, that epilepsy is not inheritable. Epilepsy is not even familial, he declares, the inevitable anatomic process of proliferation of neuroglia being probably acquired and accidental, possibly from the effects of birth trauma. Marie has recently asserted that the less civilized a people the larger the number of epileptics, because women are delivered clumsily and the children are badly taken care of. The effects of birth trauma, of infectious disease in childhood, of erection of the choroid plexus with hypertension of fluid—all these have been advanced recently as the causes of the characteristic proliferation of the subcortical neuroglia. The course

of epilepsy is essentially progressive, he reiterates; 75 per cent die before the age of twenty. Sudden death in the course of sleep is not uncommon, but, he adds, the introduction of phenobarbital justifies the highest hopes, as it certainly has a specific action on epilepsy. Although, administered alone, it is open to grave objections, this harmfulness can be overcome by giving it with other substances. It promises, administered properly, to modify the prognosis of epilepsy as that of neurosyphilis has been modified by the introduction of arsphenamin. In concluding his review of the medicolegal features of epilepsy, Ducosté remarks that there are no special asylums in France for epileptics; the insane epileptics are interned, but it is a problem what to do with them in their lucid intervals.

Amantea, G. EXPERIMENTAL EPILEPSY. [Arch. f. d. ges. Physiol., 1921, CLXXXVIII, 287; Med. Sc.]

About 25 per cent of normal dogs exhibit a hyperexcitability of the motor cortex to unipolar stimuli, and in these (but not in normal) dogs typical epileptic seizures may be produced by stimulation of the skin when the sensori-motor cortex of the corresponding area of the cerebrum has been rendered still more excitable by local application of 1 per cent strychnine. The attack commences in those muscles the motor centers of which have been treated with strychnine. After strictly local cauterization of the treated centers, stimulation of the reflexogenous skin zone is ineffective. Stimulation of these before applications of strychnine to the center is also ineffectual.

Sittig, O. PROLIFERATION OF NEUROGLIA AND OTHER CHANGES IN TRAUMATIC EPILEPSY. [Zschr. f. d. ges. Neurol., Vol. LVIII, p. 26.]

A case of gunshot wound of the head which, after completely favorable healing of the injury to the brain, suddenly, perhaps a year later, fell into status epilepticus and died after two days. There was established the findings described by Spielmeyer of a bush-like proliferation of neuroglia in the molecular layer of the cerebellum and also in the cerebrum, especially in the peripheral layer, more or less pronounced proliferation of neuroglia with diffused karyokinetic figures. This greatly diffused neuroglia proliferation is here attributed to a primary injury of the nerve parenchyma. It is remarkable that these changes can be proved after only a two days' illness clinically. The author agrees with Spielmeyer in explaining the arborization of the molecular layer of the cerebellar cortex as an expression of the expansion of the processes of the Purkinje cells.

Thompson, J. CONVULSIVE SEIZURES IN VERY YOUNG BABIES. [British Medical Journal, October 29, 1921, No. 3174.]

On the basis of a study of the notes on 200 cases of convulsions in infants under three months, the author here divides them into three:

groups, namely: (A) Those due to local injury or disease of the brain or its membranes. (B) Those dependent upon cerebral disturbance due to acute disease of organs other than the brain. (C) Those due to cerebral disturbance connected with various forms of general infection and of debility. Under the latter group he classifies convulsions due to tuberculosis, congenital syphilis, debility, whooping cough, and the idiopathic convulsions of early infancy. It is to the latter he directs special attention. These occur during the early weeks of life and are not very common, for in the last twenty-five years he has seen only thirty-five cases in very young babies and two in rather older infants. In a typical case the child, when two or three weeks old, begins to have slight twitchings of the face and limbs, which recur at regular intervals, and soon develop into regular convulsive seizures of short duration. The fits may become very numerous and continue for weeks if they are not successfully treated. The administration of bromide has little or no effect in stopping the attacks; but if chloral is given cautiously and continuously in a sufficiently large amount, the fits not only cease rapidly, but do not return when the drug is discontinued; and the child grows up perfectly healthy in mind and body. There are two dangers connected with the treatment by chloral. One of these is the danger of inhalation pneumonia being set up if the child is carelessly fed while deeply under the influence of the drug. The other arises when the chloral is given in too small quantities. When this is done the drug may only depress the child's vitality without preventing injury to the brain cells by the toxin of the disease, and the damage done may permanently injure the child's mental condition. A search for some analogous phenomena which may possibly help to explain the action of the drug in these cases has led to the discovery of a fact which seems to have a bearing on the question. It has been observed by C. Richet, Besredka, and others, that when a guinea-pig is put deeply under ether, alcohol, chloral, or certain other narcotics, before a second dose of a serum which is usually rapidly fatal, the expected anaphylactic shock is generally suppressed altogether, and after a period of unconsciousness the animal "awakens vaccinated." These experiments suggest the possibility that this particular type of convulsions may be due to a peculiarly modified form of anaphylaxis, or some similar process set up by the ingested cow's milk. The writer thinks there is enough information available to justify one in saying that this is at least the most hopeful direction in which to look for an explanation of the facts. Two somewhat different types of severe acute poisoning from cow's milk, which apparently depend on anaphylaxis, may be met with in the young, both of which fortunately are extremely rare. If it should be shown that the above hypothetical explanation of these cases is correct, the question naturally arises as to whether, when symptoms of poisoning from cow's milk, white of egg, oatmeal, or other common foods occur in young children, they might not be stopped permanently if the patient were subjected to a thorough chloralization for some days, while continuing the

offending diet, and even whether a tendency to asthma and eczema beginning in infancy might not be permanently arrested in a similar way. [Med. Rec.]

Trocello. TREATMENT OF EPILEPSY BY BORAX AND POTASSIUM TARTRATE. [Ann. di med. nav. e colon., November-December, 1921.]

The treatment of epilepsy by borates is here reported upon with an exhaustive review of the literature. His own observations were made on eight patients with epilepsy of long standing. Tartrate of borax and potassium was given in doses of three grams daily. The attacks in seven cases were reduced in number and intensity, disappearance of the fits being noted for three months in one case and for one month in another. Transformation of the motor attacks into mere spells of vertigo was also noted, in conformity with the observations of French neurologists. In five cases the tartrate proved more efficacious than the alkaline bromides. Psychical improvement was noted in five cases. The present series shows that good results may be obtained even in cases of long standing.

Ashe, J. S. OVARIAN INSUFFICIENCY AND EPILEPSY. [Dublin Jourl. of Med. Science, May, 1920, IV, No. 3.]

The causal relation between gonadal defect and epilepsy is here set forth. The toxin, he assumes, which acts as a predisposing factor in epilepsy, is produced by (a) absence, diminution, or change in the ovarian ferments leading to (b) some multiple functional deficiency of the endocrine organs which upsets the hormone balance, producing other hypothetical toxic substances which cause the epilepsy.

Graves, T. C. HYSTERO-EPILEPSY WITH DELAYED PUBERTY. [Lancet, December 4, 1920, II, No. 23.]

This is a clinical report of a case of hystero-epilepsy occurring in a twin with delayed puberty. Testicular extract was used with apparently good results.

Ebraugh and Stevenson. INTRACRANIAL PRESSURE CHANGES IN AN EPILEPTIC. [Johns Hopkins Hosp. Bul., December, 1920, XXXI, No. 358; J. A. M. A.]

The studies reported on by Ebraugh and Stevenson were made on a patient who had a sufficiently large area of bone defect in his skull the result of an operation which failed to relieve him from his attacks of epilepsy. The intracranial pressure changes were measured by the application of an inverted tambour. Roughly they follow absolute pressure changes in the cerebrospinal fluid. Rhythmic changes in intracranial pressure of various types have been recorded. Epileptic attacks are associated with a rise in intracranial pressure and are unaccounted for by activities of the patient. A rise of blood pressure sometimes occurs with the rise of intracranial pressure during the attacks. The patient gives subjective complaints associated with these changes. Petit mal attacks

show typical kymographic tracings of pressure changes. Intracranial pressure is lowered by the intravenous and oral administration of hypertonic solutions. The oral administration of 200 c.c. hypertonic Ringer's solution gives a transient fall of 20 mm. water with a terminal rise of pressure. From 30 per cent hypertonic glucose given intravenously a prolonged fall of pressure, averaging 20 mm., after a slight initial rise, was noted. These changes represent far greater changes in the true intracranial pressure. Glucose is more ideal to use for therapeutic purposes. The administration of hypertonic solutions (water) gives a constant increase of intracranial pressure. These changes are adequately controlled by the use of isotonic solutions.

Clark, L. P. EPILEPTOID OR FAINTING ATTACKS IN HYPOPITUITARISM. [Am. Jour. of Med. Sciences, February, 1922, CLXIII, No. 2.]

In this clinical paper Clark emphasizes the fact previously described, that rapidly growing adolescents often have relatively benign fainting attacks which seemingly simulate larval forms of petit mal. Clark maintains that they are to be differentiated from epilepsy because they lack the fundamental make up of the epileptic as postulated by his own studies. The syncopal states are a part of the clinical picture of dyspituitarism, in which the anterior lobes of the pituitary are hyperactive. With the fainting, low blood pressure, vasomotor ataxia, slow pulse, and a host of defective muscular and skeletal displacements are noted. Character delinquencies and slow mental development are often observed. Treatment should be physical plus opotherapy. Mild cases recover spontaneously by gradually restoring the glandular and physical balance.

Buscaino, V. M. EPILEPSY, ANAPHYLAXIS, AND DYSTHYROIDISM. [Schweiz. Arch. f. Neur. u. Psych., 1920, VII, No. 2; J. A. M. A.]

Buscaino found octahedral crystals of presumably protein origin in the thyroid tissue in 84 per cent in thirty-nine persons with idiopathic epilepsy or other disease inducing convulsions. In sixty-one other persons with no history of convulsions they were found only in 15 per cent. This and other data presented sustain, he says, his assertions made in 1915 that the idiopathic epileptic seizure is an attack of anaphylaxis induced by abnormal proteins getting into the blood. He thinks that the source of these abnormal proteins is probably in the thyroid.

8. NEUROSYPHILIS, SPINAL, TABES, PARESIS.

Magnus. NEUROSYPHILIS. [Norsk Mag. f. Laegvid., January, 1922, LXXXIII, No. 1.]

In this clinical contribution the author states that his own experience with 232 cases in private practice is that 20 per cent of syphilitics have neurosyphilis. Of these, 96 had had no treatment; 10 only had been treated with salvarsan for the initial infection. Systematic examination

of the spinal fluid is the only means to ward off grave neurosyphilis. Paresis once developed, it is useless to keep on with specific treatment. With tabs the lancinating pains alone may be helped by salvarsan.

Savory, C. H. EPILEPTIFORM FITS AND COMA IN SYPHILIS. [Lancet, August 7, 1920.]

Savory suggests that epileptiform fits in syphilis are not so uncommon as is commonly thought, and are early manifestations of the disease. Epileptic attacks suddenly occurring in adults, when there is no previous or family history of epilepsy, should be investigated for syphilis.

Brown, W. H., and Pearce, L. EXPERIMENTAL SYPHILIS. [Arch. Dermatology and Syphilology, November, 1920.]

These experimental studies show in a restricted manner that spirochetal infection of the testes of rabbits is possible and that within a comparatively short time the nervous system in rabbits becomes involved.

Mensi, E. INHERITED NEUROSYPHILIS. [Rivista di Clinica Pediatrica, November, 1920, XVIII, No. 11; J. A. M. A.]

Mensi found 11.11 per cent giving a positive Wassermann reaction in 540 young children examined, and in 23 per cent of 114 cases of disease of the nervous system. He tabulates the details of these 114 cases of nervous disease, and calls attention in particular to a girl of eight with inherited syphilitic taint who presented the complete clinical picture of cerebrospinal sclerosis. Another girl of seven presented the spastic paresis described by Marfan, with a tendency to obesity. He compares these cases with Gianelli's case in a young woman with supposed Friedreich's disease, but necropsy revealed syphilitic changes in the central nervous system instead of the findings of Friedreich's disease. Mensi's case corroborates Gianelli's assertion that inherited neurosyphilis may induce the identical clinical picture of familial ataxia and spastic cerebrospinal paresis. The practical importance of the inherited neurosyphilis as a factor in these diseases is evident in the improvement under specific treatment. The psychic anomaly may be due to lesions of the nervous system or to perverted functioning of the ductless glands. The inherited syphilis does not induce actual Friedreich's disease or actual spastic paralysis; it merely simulates them, and under early, intense, and long continued treatment the symptoms may subside. In conclusion, he describes the subsidence in this way of what seemed to be Little's disease in a boy of four, improvement soon appearing under intramuscular injections of neoarsphenamin. The importance of supplementary organotherapy is also emphasized.

Ramadier, J. INHERITED SYPHILIS AND THE EAR. [Presse Médicale, August, 1921, XXIX, No. 62.]

A sign which the author calls the "sign of a fistula without fistula" he holds is frequently found in the ears of young individuals with inher-

ited syphilis. It is conditioned upon a syphilitic osteitis of the bony capsule of the labyrinth.

Noguchi, H. VENEREAL SPIROCHETOSIS OF RABBITS. [J. A. M. A.; 1921, LXXVII, 2052-3.]

Noguchi describes a form of venereal spirochetosis occurring spontaneously in rabbits, caused by a spirochete, *Treponema cuniculi*, and somewhat resembling the experimental syphilis of rabbits. The lesions consist of scaly papules on the genital region, and the affection may be transmitted directly by mating or indirectly by applying the exudation with or without scarification. *T. cuniculi* is rather longer and coarser than the *T. pallidum* and more rapid in its movements of rotation. The incubation period varies from twenty to eighty-eight days. Inoculation of apes and the Wassermann reaction were both negative, but the spirochetes disappeared from the lesions in twenty-four hours after an injection of arsphenamine. Noguchi finds the following strain useful for demonstrating both *T. cuniculi* and *T. pallidum*: Fix films for five minutes in one part formaldehyde, nine phosphate solution (88 parts Na_2HPO_4 , 12 parts KH_2PO_4). Flood with saturated alcoholic solution of gentian violet or fuchsin; wash and dry. [Med. Sc.]

Klarenbeek, A. ON *TREPONEMA PALLIDUM* VAR. *CUNICULI* IN RABBITS. *Centrabl. f. Bakteriöl (&c.)*, Abt. 1, 1921, Orig. LXXXVII. 203; Med. Sc.]

From his observations the author considers that the *treponema* found in spontaneous lesions in rabbits is indistinguishable from *T. pallidum*. In experimental infections there are only very slight and inconstant differences between them, so that he is inclined to regard the rabbit *treponema* as a variety of *T. pallidum*, and he proposes the name *T. pallidum* var. *cuniculi* and the disease *lues cuniculi*.

Gordon. SYPHILIS IN HYPERTHYROIDISM AND MYXEDEMA IN CHILDREN. [N. Y. Med. Journ., March 15, 1922, CXV, No. 6.]

In this clinical laboratory study of the Wassermann and luetin reactions Gordon examined forty-two children suffering from some form of hypothyroidism. His findings seemed to show that syphilis is not of great importance in the causation of hypothyroidism in children. Syphilis may attack the thyroid with the production of these conditions. Mental defect was present in three of the five positive cases.

Bolten, G. C. LUETIC MYELITIS. [Nederlandsch Tijdschr. voor Geneeskunde, February 18, 1922, LXVI, 719.]

Bolten reports two cases of luetic myelitis which were absolutely rebellious to anti-luetic treatment. The first, aged fifty-six, was infected at forty, and was treated by mercurial inunction. For eight years he has walked badly, and has not improved. Gait is markedly spastic-paralytic; he has exaggerated knee- and ankle-jerks, a suspicion of bilateral

Babinski sign, no objective sensory signs, but for a long time severe pains in legs and sometimes in loins; bladder and rectum normal. The second patient also showed the spastic symptom-complex without other signs of myelitis. In both cases the Wassermann reaction has never become negative under treatment. It is just these cases of syphilitic spastic paralysis that have the worst prognosis; this may be due to a special virulence of the spirochetes or to the special vulnerability of the human pyramidal tracts; this luetic spastic spinal paralysis is thus a degenerative and not truly an inflammatory process. [Leonard J. Kidd, London, England.]

Bonnamour and Vachez. A CASE OF THE GUILLAIN-THAON SYNDROME. [Presse Médicale, March 25, 1922, p. 262.]

The writers report the case of a man, forty-four, who had syphilis in 1904, but had then had but little treatment for it. Five years later nervous symptoms began to appear, in spite of large doses of mercury and neosalvarsan. After twelve years more he had an ataxic gait, Rombergism, sensory changes with pains, incontinence of urine, and inequality of pupils; but the Argyll Robertson pupil was not present. With these tabetic signs he had great exaggeration of knee-jerks, the other reflexes being normal; there was a right Babinski sign, also fibrillary tremors of the tongue, and disturbances of language and writing. Negative Wassermann and normal cerebrospinal fluid. A prolonged course of small doses of neosalvarsan did so much good that the patient contemplated a return to his work. Except for the absence of the A.R. pupil and of lymphocytosis of the spinal fluid, the case corresponds to the syndrome of Guillain-Thaon which forms a transition between true tabes, general paralysis, and specific myelitis. [Leonard J. Kidd, London, England.]

Mills, A. WASSERMANN TEST IN GENERAL PRACTICE. [Edin. Med. Jour., January, 1922, XXVIII, No. 1; J. A. M. A.]

Mills has found that a patient suffering from inherited syphilis may have a positive father and a positive mother, or a positive father and a negative mother. He has not yet met with one having a negative father and a positive mother. A positive father may propagate syphilitic children long after he has ceased to be directly infective to the mother. In an industrial school of which Mills is medical officer, 70 per cent of the children are the subjects of inherited syphilis. Many patients display none of the orthodox cardinal signs. An infant may be suffering from inherited syphilis, though there be no history of rash, snuffles, or condylomata. Inherited syphilis may manifest itself in a variety of other conditions, curable by anti-syphilitic treatment, and these conditions were not recognized in the past as being caused by syphilis. The sole manifestation of inherited syphilis in an infant may be dietetic difficulties, with little or no increase in weight or with actual wasting. Inherited syphilis may explain recurring attacks of gastro-intestinal disturbance in older children

and in adults. In particular it may explain attacks of abdominal pain which may lead to a diagnosis of appendicitis, gall stones, Dietl's crisis, and probably of other acute abdominal conditions. Syphilis can produce in a young child a condition impossible to distinguish from tuberculous peritonitis. The external appearances of anemia of a persistent nature and not improved by medication with iron may be the sole manifestation of inherited syphilis. Syphilitic affections of bones, joints, and glands are common. Epilepsy is frequently the result of syphilis. Miscarriages may be predisposed to by inherited syphilis. Anginal symptoms, not necessarily those of true angina pectoris, are naturally a frequent result of syphilis. His blood is definitely positive, and Mills states his respiratory trouble may be syphilitic in origin. A gummatous infiltration of the bronchi may produce bronchiectasis. Syphilis can give rise to as many symptoms as there are functions of the nervous system. Mills points out that the possibility of a child having acquired syphilis must not be forgotten.

Raeder, O. J. FEEBLEMINDEDNESS IN HEREDITARY NEUROSYPHILIS. [Am. Jour. of Diseases of Children, March, 1921.]

Wassermann studies on the blood and C.S.F. on twenty-two children born of syphilitic parentage are here subjected to analysis. Various degrees of syphilitic infection were present in a family of several children, the oldest, born just after the parental infection, showing the greatest injury, and the succeeding children showing successively milder degrees. A parallel loss of mental capacity was also demonstrated by mental examinations. The youngest, though seronegative, was feeble-minded to a slight degree. Mental deficiency in congenitally syphilitic children of not feeble-minded parents, Raeder concludes, is in the majority of cases due to syphilis.

Merklen, Devaux, and Desmoulière. DIAGNOSIS OF SYPHILIS. [Paris Med., March 26, 1921; J. A. M. A.]

"Syphilis may impair the functioning of various organs without direct symptoms from them, and even with negative Wassermann reaction." . . . "The great danger from the Wassermann reaction is that we assume that a negative reaction implies the absence of syphilis. The Desmoulière cholesterin modification of the Wassermann technic is much more sensitive, and this may reveal the syphilitic basis of the asthenia, the anemia, ready fatigue, backward growth and development at puberty, the loss of mental balance, dystrophia, strabismus, ptosis, etc." The writers urge in conclusion not to be frightened away from the truth by the innumerable constant responses to the Desmoulière cholesterin serodiagnosis. "However high we estimate the proportion of persons with inherited or acquired syphilis, we yet will fall short of the truth."

BOOK REVIEWS

Freud, Sigm. GROUP PSYCHOLOGY AND THE ANALYSIS OF THE EGO. [International Psycho-analytical Library, No. 6, London.]

Freud's Group Psychology and the Analysis of the Ego is an exceedingly interesting little book, which makes telling presentations of the libido mechanics, so to speak, that enter into the formation of human groups. There is a general agreement with Le Bon's description of crowds in his *Psychologie des Foules*. But Freud points out that although an exceedingly good description has been given, no real advance has been made toward the understanding of the nature of the phenomena which we have observed. To say that the leader has prestige and that people are affected by numbers, that a new element is introduced with a multitude, is not to give any explanation at all of the different way that man acts in a group from the way that he acts individually. Le Bon's group is the more or less spontaneous, unorganized crowd that lacks responsibility, is fickle, changeable, ruled by common emotion without reason, childish, savage, illogical, brutal or heroic. The individual of this group is ruled by the unconscious, which for a time runs in unison with the unconscious in the minds with which it is associated. He is impetuous, is hypnotized by the crowd, and has given up his discretion. Freud thinks that Le Bon has failed to bring into sufficient prominence the function of the leader, and has not at all satisfactorily described the source of his power.

Freud points out that McDougall's view of an unorganized crowd is no more flattering than Le Bon's. He also likens its behavior to that of an "unruly child" or an "untutored, passionate savage." However, McDougall contrasts this with an organized group, which is collective life at a higher level. He gives the following conditions as necessary to the organized group; continuity by tradition, fixed positions and so on; consciousness, on the part of its members, of its nature and purpose; an interaction with other such groups; customs, habits, and a definite structure. These conditions permit the use of individual intelligence worked into a system, instead of the dominance of changing, common emotions or passions which sway the crowd, maybe to destruction.

Feeling that the words *suggestion* and *prestige* do not bring one to a final explanation of the group psychology, and doubting that suggestion is an "irreducibly primitive phenomenon," Freud then makes use of the libido concept to reach some explanation for the formation of groups. Freud's libido corresponds closely to Plato's Eros. It is a force. It is love in the widest sense, and is not the erotic impulse only but all those interests and feelings that have

grown out of the creative instinct and are creative in character. Is it not true that this force holds, under desirable or undesirable conditionings, individuals temporarily or constantly into groups?

The army and the church are taken as two examples of the organized group. The army is held together by the identification, and the reinforcement which this gives to the individual, of the soldiers with each other, and in a common merging of their ego ideals in the person of the commander. The libido must either play upon the ego or some external object. In this case there is to some extent an identification of the various egos with a common libidinal flow toward the commander who also represents an abstract idea. In the case of the church a more complicated process takes place. Properly Christians can not only identify themselves with each other in a sympathetic love of Christ, but they must also to some degree identify themselves with Christ in the love that he feels toward all Christians. There are here two identifications and two objects.

A panic occurs, Freud thinks, when in an army the common object upon which all the libidos are turned is lost. The group is then dissolved and there is left only the selfish interest of individual preservation, with a spirit of the devil take the hindmost. A leader is necessary to a group. And the group is formed by a diversion of the sex instincts from their primitive sexual aim, which acts with unabated energy upon a common object. It is a lesser and modified form of being in love. And being in love means a great encroachment upon the ego—the ego is then to a varying degree shelved for an outside object.

Freud discusses the subject of identification. He says that "first, identification is the original form of an emotional tie with an object; secondly, in a regressive way, it becomes a substitute for a libidinal object tie, as it were, by means of the introjection of the object into the ego; and thirdly, it may arise with every new perception of a common quality shared with some other person who is not an object of the sexual instinct." If we distinguish the ego, the primitive self, from the ego ideal, which embraces the demands of the environment, conscience, critical faculty and so on, we are concerned with which of these parts of our ego the identification takes place either in love or in group formation. In love the libido that is formerly attached to the ego relinquishes its hold and attaches itself to the object loved, which has taken the place of the ego ideal. Freud says, "A primary group (one with a leader and not too much organized) is a number of individuals who have substituted one and the same object for their ego ideal and have consequently identified themselves with one another in their ego."

But Freud then admits that it is not quite so simple as this and recognizes that there is a riddle in the fact that in ordinary society every individual acts suggestively upon every other.

He quotes Trotter as saying that biologically gregariousness is an analogy to multicellularity (the multicellularity of the organism) in that it is a sort of continuation of this. From the standpoint of the libido theory, the libido manifests this inclination to combine into

more comprehensive units. Trotter considers the herd instinct as fundamental, that is, as a primary instinct. Freud feels that he, even more than Le Bon and McDougall, takes too little account of the leader. Freud, moreover, does not think that the herd instinct is irreducible. He believes that its origin in man arises from the family situation. At first there is no group feeling observed in children. From the adjustments that the children of a family are a little later obliged to make, he thinks a communal feeling grows, which is further developed at school. "What appears later on in society in the shape of group spirit does not belie its derivation from what was originally envy. . . . Social justice means that we deny ourselves many things so that others may have to do without them as well, or what is the same thing, may not be able to ask for them. This demand for equality is the root of social conscience and the sense of duty."

If the herd instinct involved only man, we might more complacently accept the theory that original hostile feelings of children, reversed into a positively-toned tie of the nature of an identification, lays the foundation for gregarious association. To be sure, the young calf gives evidence of distress at even temporary separation from its mother, but it has no jealous rivals for its mother's attention and is not obliged to go through family adjustments. Yet cattle are distinctly herd animals. Freud, however, makes the correction that man should be called a horde animal.

He then assumes an archaic, primitive horde ruled over by a powerful male who suppressed the sex aggregation of his sons. These latter finally combined and killed the father. Later followed a matriarchal phase. These, Freud states, are merely hypotheses to try out psychologically. The later totem is assumed to be a symbolical continuance of the primal ruling male, who dominated by fear and was overthrown by the grouping of other males—a combination that we do not see taking place in animals. The ruling bull deals with the others one by one. Freud says that the primal father is the group head, which governs the ego in the place of the ego ideal. The varying tribal orders through which the race has passed have very early established in man a tendency to group formation.

Freud sees in the tension between the ego and the ego ideal the possible explanation for mania, which may be a breaking through of, and sweeping along of the ego ideal. In the saturnalia and the religious orgies of the past, the ego reinforced by the other egos and relieved of the usual taboos, has a magnificent festival and is once more satisfied with itself. And he thinks that there is always a feeling of triumph when something in the ego coincides with the ego ideal. Opposite to this is a sense of guilt or inferiority.

The book is short and does not attempt a thorough exposition of these theories. It is full of suggestion and while one does not close it with anything like a satisfied feeling of completeness, it brings to any one at all familiar with psychoanalytic thinking some further impressive thoughts that add to the theories that psychoanalysis has

developed. The translation, the work of James Strachey, is very intelligent and satisfying. H. CARNCROSS (Philadelphia).

Kappers, C. U. Ariëns. DIE VERGLEICHENDE ANATOMIE DES NERVENSYSTEMS DER WEIRBELTHIERE UND DES MENSCHEN. II. Abschnitt. [De Erven F. Bohn, Harlem.]

We have been pleased to commend in the highest terms Vol. 1 of this Comparative Anatomy of the Nervous System of Vertebrates and of man. Vol. II appeared shortly after and we would call renewed attention to this important work.

Vol. II deals with the comparative anatomy of the cerebellum, the midbrain, the interbrain and the forebrain in the same comprehensive and yet singularly lucid manner as has been seen in Vol. 1. Even the tyro in the German language can follow Kappers' thought, so simple and direct is his mode of presentation. Even the student with almost no knowledge of German can follow the thought because of the great number of illustrations which are so well arranged that the phyletic development of the nervous systems of the animal kingdom can be read in pictures as one simply turns over the pages.

As in the previous volume Ariëns Kappers takes up the lower vertebrate forms and elaborates the advancing structural integrations which new functions have made necessary and possible. Everywhere one finds this functional need emphasis, thus rendering the work more than a comparative anatomy, but also a comparative physiology.

The seventh chapter, pp. 625-769, takes up the cerebellum in the advancing vertebrate phylum from Petromyzon to Man. This organ gradually is formed at the head end of the medulla to handle somatic sensations, mostly but not all, of a proprioceptive nature. It is formed in the lateral, somato-sensory—not out of the viscerosensory area of the alar plate and in relation to the octavus-lateral line receptors. The precise nature of the inner histological structure seen more or less repeated in the various forms is first presented, and then the morphology and connections of the various types developed. The section on localization in the cerebellum is most reasonable and the summary of the general nature of cerebellar function logically elaborated from Petromyzon, where the cerebellum and the octavus and lateral line organ nuclei are one (area vestibulolateralis) through all the complicated adjustments, to gravity and inertia in more complex forms.

In the same fascinating manner Kappers deals with the midbrain and interbrain in Chapter VIII (pp. 769-945). The general development of the midbrain is to serve the purpose of a correlation area of the vital sensory stimuli and a primary optic and static stimulus station. In lower vertebrates the midbrain makes up the larger of these two brain parts. Of the interbrain in the lower forms, only the epithalamus and hypothalamus are well developed; these conduct olfactory stimuli chiefly and, correlated with other vital stimuli, these are delivered to the motor areas of the oblongata. In the anterior basal portion of the interbrain in nearly all vertebrates there is a

sympathetic (vegetative) center, located near the place where the sulcus limitans reaches the recessus praeropticus, where in many vertebrates root fibers of the nervus terminalis are accompanied by sympathetic fibers for the vessels of the head. In lower vertebrates there is present in this the nucleus magnocellularis praeropticus, also the (sympathetic) fibers for the blood vessels of the Saccus vasculosus and the Hypophysis. In the higher animals additional sympathetic nuclei are present.

In still higher types the portion lying above, the thalamus, in its strict sense, grows proportionately larger, especially its dorsal portion, and plays an important rôle in the cortical projection of gnostic (epicritic) stimuli. Through the further development of stereognosis this advances in its development and importance beyond the primitive vital centers of the midbrain.

The ninth chapter deals comprehensively with the Secondary Forebrain or Telencephalon, especially with reference to the olfactory system and the Corpus Striatum. Here he traces embryologically the further evolution of the dorsal alarplate of the interbrain, proceeding beyond the sulcus limitans. From Amphioxus upward the developmental structuralization is very clearly shown. The evolution of the rhinencephalon and the archistriatum, paleostriatum (sympathetic centers) and neostriatum, as well as the paleopallium, archipallium and neopallium is most fascinatingly discussed and copiously illustrated. The clinical importance of this general region has been most dramatically intensified by the many encephalic syndromes of recent years. This chapter by reason of its great simplicity of presentation and yet profound grasp of its intricate functions is most alluring. Nowhere have we found so satisfactory a discussion of the morphological differentiation of this complex region as that presented by Kappers, and it is especially gratifying to American neurology to note his large acceptance and utilization of the work of the American school of comparative neuroanatomy founded by the elder Herrick. We would fain present *in toto* the summary of the striatal structures, given by Kappers, pp. 1103, 1104, 1105, but lack of space forbids. We could call special attention to this most comprehensive review of these structures, in view of the clinical situations already alluded to.

Finally Chapter X (pp. 1118-1267) takes up the Development of the Forebrain Mantle of Mammals. This chapter is as equally stimulating as all of the others but by reason of its more intricate nature we must forbear further analysis. It is copiously illustrated, here with colored plates, and leaves little unsaid.

Special mention should be made of the rich and discriminative bibliographical references appended to each chapter. Here the research student will find everything of importance that has any bearing on the problems so ably set forth.

We have said enough to show that this work will stand as one of the great monuments of neurological research and a judicial and comprehensive survey of our present knowledge of the structural development of the nervous system as well as a prophetic forecast

of later evolution in this most important field of humanistic interest. [JELLIFFE.]

Storch, Alfred. *THE PRIMITIVE ARCHAIC FORMS OF INNER EXPERIENCE AND THOUGHT IN SCHIZOPHRENIA.* Nervous and Mental Disease Monograph Series, No. 36. [Nervous and Mental Disease Publishing Company, New York and Washington, 1924.]

In recent years the Tübingen school of psychiatrists have been producing some most interesting and valuable work. This one of its latest productions, splendidly translated by Miss Willard, Librarian of St. Elizabeths Hospital, Washington, D. C., offers most fascinating material for everyone at all interested in the subject of primitive thinking.

Not only does Storch's discussion prove illuminating to the student of psychiatry, especially to those dealing with the thought forms seen in dementia precox and its allies, but in his treatment of the problems involved he has shown how the methods of genetic psychology can be utilized to interpret and make real a vast group of psychological reactions seen throughout the entire social fabric.

This is one of the most fascinating of the modern works founded upon a genetic psychological approach which the author would show is even broader than the psychoanalytic viewpoint, which even if it had primarily directed attention to the characteristic features of the schizophrenic yet, since it was more of an analytic science, needed to be supplemented by the genetic method. This work can be heartily recommended to neurologists, psychiatrists, intelligent laymen, psychologists, theologians, and even jurists.

Collins, Joseph. *TAKING THE LITERARY PULSE. PSYCHOLOGICAL STUDIES OF LIFE AND LETTERS.* [George H. Doran Company, New York.]

Collins gives us cursory reviews of many writers of the day. They form a record of his own passing, superficial reactions to a wide reading, rather than a profound psychological investigation of the significance of the material as the pulsebeat of humanity. Here and there is a gleam of the deeper light which an experienced psychiatrist might throw into such material, and a summary which excites to earnest thought. One cannot, therefore, read the book without appreciation that the writer has brought something out of his wide reading to the general public. Yet the psychiatric and the psychological statements are often so naïve and even trivial that they are misleading. Collins continues to fling about the phrases of the Freudian psychology in an airy rejection of them, although it is evident enough that he understands but little of the substance of this psychology. This seriously vitiates his appraisal of those works which he assumes to represent it or to be based upon its tenets. It makes him an untrustworthy judge of the truth of such a basis for certain works which he reviews.

The same lack of serious exercise of thought and of care in

manner of presentation impairs the literary value of the book. It is not alone that Collins' style is unpolished and marked by a repetitious colloquialism: one wonders if many of the selections chosen by him are worth the consideration he gives them. He almost tells us that they are not. And yet he has given them much space, without succeeding in recommending them to us. In other instances, his estimate of an author is too evidently a biased one to do the writer justice. Here a profounder psychology would bring a fairer appraisal, just as the presence of other authors and their works could be justified only on the same ground. Psychological merit to the work would have shown us the true beating of the psychic pulse, whether the work has literary value or not.

Peirce, Charles S. CHANCE, LOVE AND LOGIC. Edited by Morris R. Cohen, with a Supplementary Essay on the Pragmatism of Peirce by John Dewey. [Harcourt, Brace and Company, New York.]

From time to time there appear signs of some hope for the advancing intelligence of the human race. The establishing and able editing of this Library of Philosophy is one, and its including this collection of Peirce's strikingly original essays is another. In the Preface, Peirce's mind is spoken of as one of the great seminal minds of recent times. The pragmatic movement grew out of it and its general attitudes have stimulated and nourished many of the best thinkers of America and Europe. It matters little whether one is in sympathy with the pragmatic attitude or not, it is certain that most thinking began by the series of experiments which pragmatism so strikingly illustrates.

When "Mr. Dooley" told us about Pragmatism in his inimitable way—asking "What is Truth?" and answering: "Truth is truth, whan it works," he struck the nail on the head in a crude and forceful manner that has made his discussion almost a classic.

The principle of a truth that develops in the testing of its postulates is but a small part of the whole body of ideas here set forth so splendidly. Contemporary science is fortunate in having this collection of stimulating essays. They are especially recommended to neuropsychiatrists.

Monrad-Krohn, G. H. THE NEUROLOGICAL ASPECT OF LEPROSY ("Spedalskhed"). [Jacob Dybwad, Christiania.]

This valuable monograph takes the reviewer back to the leprosy hospitals of Christiania and of Bergen which he visited many years ago, of which a vivid picture has always remained.

The author has given us in English a very careful and complete neurological study of this disorder, which, although rare in Europe, is found in millions of cases in India, in the Congo, and in other localities. Hence its importance is still not to be underrated, especially with reference to early diagnosis, without which no real prophylaxis is possible. Although skin lesions are frequent, they may be absent in enough cases and only nerve lesions present, so

that early diagnosis is missed. Thus the author's correct emphasis on a strict neurological examination in every case of suspected leprosy.

His further descriptions of the nerve involvements are very complete and worthy of the highest commendation.

Haecker, Valentin. ALLGEMEINE VERERBUNGSLEHRE. Dritte umgearbeitete Auflage. [Friedr. Vieweg v. Sohn, Braunschweig.]

The subject of heredity, especially in its newer Mendelian settings, has become of increasing importance in all medical study and practice. In neuropsychiatry especially the conception is loosely used and indeed misused. Although we possess a number of useful studies in English this work of Haecker's is classic and in its new third edition is one of the best guides for the student and an excellent summary for the geneticist.

Parkinson, James. AN ESSAY ON THE SHAKING PALSY. [London, 1817: Photographic Reprint by the American Medical Association Press.]

This classic has here been reproduced in facsimile. There were only four or five copies of this original in our American libraries. It is now made available to all interested in this remarkable essay.

Seligmann, Herbert J. D. H. LAWRENCE. AN AMERICAN INTERPRETATION. [Thomas Seltzer, New York. 75 cents, cloth; 25 cents, paper.]

Of all modern novelists Lawrence has the most claim to the attention of the neuropsychiatrist. He is undoubtedly the most gifted in seeing into the soul of the human being and making it singularly articulate. His essays into the psychoanalytic field were duds; his intuitive insight far transcends his scientific plotting of human motivation. This little brochure will be welcomed by many of Lawrence's admirers.

Bibliographic Service. Vol. I. [Wistar Institute of Anatomy and Biology, Philadelphia.]

Here are collected a valuable series of abstracts from the papers appearing in the *Journal of Morphology*, *Journal of Comparative Neurology*, *American Journal of Anatomy*, *Anatomical Record*, *Journal of Experimental Zoölogy* and *American Anatomical Memoirs*, between the years 1917-1919.

They are grouped under General, Anatomy, Chemistry, Cytology, Embryology, Genetics, Histology, Neurology, Physiology, White Rat and Zoölogy.

The research worker in any and all of these fields will find this a very desirable volume for his library.

Krause, Rudolf. MIKROSKOPISCHE ANATOMIE DER WIRBELTHIERE. III. Amphibien. [Walter de Gruyter & Co., Berlin and Leipzig.]

In two preceding monographs Krause has given masterly volumes on the microscopical anatomy of mammals, birds and reptiles. The

present volume (pp. 455-608) gives an equally detailed description of the microscopical features of amphibia.

It is a beautiful piece of work, the section on the nervous system being especially full and well illustrated.

A following volume on fish, cyclostomes and leptocardians will complete this masterly presentation.

Brugia, R. LA IRREALTA DEI CENTRI NERVOSI. [L. Cappelli, Bologna.]

An extremely scholarly and readable monograph which in general discusses the whole problem of the integration of the nervous system, with full historical development, and that would emphasize the more modern aspect of its essentially reflex nature. The idea of *centers*, per se, as activators of motion, physiological or symbolic (psychic) is a faulty concept: The organism as a whole is responding tropistically to its environment, and the so-called localized centers are but stations in the reflex arc pathways.

Davies, Stanley P. SOCIAL CONTROL OF THE FEEBLEMINDED. [National Committee for Mental Hygiene, New York.]

An interesting and well written résumé of an important problem too complicated to be solved by "panaceas."

Davenport, F. I. ADOLESCENT INTERESTS. [G. E. Stechert & Co., New York.]

This is one of the monographs of the Archives of Psychology (No. 66). Its subtitle is "A Study of the Sexual Interests and Knowledge of Young Women." Just how the "objective" data were obtained which provides this "only study" the author does not state save that 160 young women going to be teachers, from seventeen years, nine months, to twenty-three years, eight months, asked 880 questions about "sex" matters, *i.e.*, about five questions each. These are "analyzed," the author tells us, and he gives his conclusions.

As one reads the questions asked one is struck with the naïve ignorance of the questioners and the silly character of the questions made the basis of this study. One cannot really see wherein the rather foolish conclusion can be deduced from the equally ignorant questions. The whole thing is obfuscated by a series of fictitious—"one term"—"two term," "three term" criteria and, to the reviewer, represents one of those befuddled efforts to bail water with a sieve so characteristic of much so-called "objective" psychology. There is more common sense in five pages of Stanley Hall's "Adolescence" than in this entire thesis.

deFleury, Maurice. LES ETATS DEPRESSIFS ET LA NEURASTHENIE. [Felix Alcan, Paris.]

This author is much interested in classifications. In the field of the psychoneuroses he has the illusion that precise definitions of classes can be made. Unmindful of the fact that in order to make a definition one must know all about the thing defined and "of what

subject can we flatter ourselves to know everything about it" (W. S. C. Schiller). As a matter of fact the author has given us a very one-sided work. His nosological discussions are, we believe, far below modern requirements, if he insists upon nosology. He seems absolutely unacquainted with the later work of Birnbaum and others who have done much to clarify nosological criteria and as for Freud's contributions to the realignment of the neuroses he is ignorant. The whole subject of the unconscious in causing the neurotic mosaic is a closed book.

The book is well written and will appeal to the superficial type of student who thinks in terms of cut and dried disease entities.

Löwenstein, Otto. EXPERIMENTELLE HYSTERIE LEHRE. [Friedrich Cohen, Bonn.]

Dr. Löwenstein, a.o. Professor at the Bonn University, and Senior Physician of the Provincial Heil u. Pflegeanstalt of Bonn, gives us in this 400 page monograph one of the most careful and scholarly studies of certain aspects of hysteria which have appeared in recent years.

The author started from practical issues. He sought to utilize some definitely controllable methods by which he could arrive at those issues involved in framing medicolegal opinions (*Gutachtung*). Concerning the intrinsic "sickness" involved in the hysterical symptoms at least two considerations must be outlined: In how far does the hysterical symptom interfere with function and how far is the origin of the symptom compulsorily founded upon verifiable psychical characteristics? The "value" of the illness must not be confounded with the necessary idea of "wilfulness."

His experiments he believes have led him to the elaboration of methods concerning the subject of "compensation" which constitute a great advance over those heretofore intuitively arrived at. They have led him to a number of interesting hypotheses concerning the significance of hysterical symptoms which he promises to collect in a later volume—their inclusion at this time would interfere with the practical issues developed in this book. He promises in his preface to show that the hysterical-personality type—widely present—has very definable reactions in terms of his objectively planned experiments.

These methods have developed from the older combined pulse and breathing graphic registrations with which we are familiar. To these he would add the tri-dimensional muscular tension registrations elaborated by Sommer, also familiar to many. On page 17 he presents a picture of the patient trussed up with head, arm, hand, foot, chest and abdomen breathing and pulse "analysers" which he would reduce to kymograph tracings in their reaction trends to "complexes" in the Jung sense, the individual curves of which are first presented. For special sense analysis algesimeters are added, and then the curves are given. These curves are all "coördinated" and the "analysis" comparisons are recorded in terms of hyper- and

hypo- "affect" registrations, of "normals," of "organic" lesioned individuals, of "simulations" and of "hystericals."

By these complicated, yet necessary, methods the author proceeds and analyzes disturbances of Sensation, Shock Reactions, Hearing Sensibility, Optic Sensations, Motility Variations, "Complex" Formations, Amnesias, Stupors, Pseudo Dementias, Suggestibility, and Hypnosis.

We cannot present all of the details of these carefully worked out results, with his final conclusions concerning their medicolegal value, presented in Chapter II.

We can only recommend most thoroughly the reading of this volume since there is no doubt that the problems can be logically entered into by such methods, even if the thought be interjected that their validity still remains but a part of the entire situation. The complexities of the "psyche," call it by any name that pleases the individual investigator, still escapes a complete appraisal, but here, at least, is an honest and intelligent effort to reduce it to some form of logical formulation.

Kellogg, Vernon L. MIND AND HEREDITY. [Princeton University Press, Princeton, N. J. \$1.50.]

The Louis Clark Vanuxem Foundation has financed a number of lecture courses given before the Princeton Graduate School. This is one of them, and a very fascinating one, beginning with a recital of what the author has observed about the behavior of the "female wasps"—"The Instinct-Mind of *Ammophila*." Proceeding to the "Reflexes of Honey-Bees and Silk-Worm Moths," he advances to a consideration of "Other Reflexes and Tropisms," *i.e.*, exhibitions of behavior governed by the simplest kind of mind, the mind of mechanics, of physics, and of chemistry. From this he proceeds to more complex kinds of mind—"Intelligence and Reason" he next terms it, built up, as he portrays it, by "Inheritance," with Galton, Darwin, and Mendel as the exponents of its principles.

"Intelligence Tests," "Education and the Mind," "Societal Organization and Mental Capacity," "Racial Traits," "Heredity and Environment in Mind Determination," these are the succeeding chapter headings of this rather popular, yet not unlogical, and easily grasped short presentation of some of the most interesting problems which all are interested in understanding or explaining.

Foersterling, W. UEBER DIE PARANOIDEN REAKTION IN DER HAFT. [S. Karger, Berlin.]

Vol. 19 of Bonhoeffer's "Abhandlungen" deals with a subject of much general interest, although too frequently conceived of as of only local importance. "Paranoid reactions in prisons" show an acute and striking constellation of phenomena which in fragmented and less spectacular manner are more or less universal in human behavior. For in a sense all human beings conceive of themselves as being "imprisoned." All of us suffer from limitations thrust upon us and we all blame "Fate" for many of our circumscribing limitations—in which frame "Fate" is a many-sided figure.

Birnbaum's "Prison Psychoses," sometime translated by Glück and Lind in the Nervous and Mental Disease Monograph Series, No. 13, is the starting point of the author's discussion, to which he brings abundant material from the Munich psychiatric clinic, the thoroughness of whose study has contributed so much to the pre-eminence of Kraepelin and his pupils.

At least 105 cases with the diagnosis of "Prison Psychoses" were available for this analysis. Many of these he could arrange with "hysterical psychoneuroses," fewer with "paranoid" pictures, and only a small number of Kraepelin's "paranoias," "Schizophrenics" diminished, by eleven, his studied material, leaving for the present monograph, of about 100 pages, twenty cases of "true paranoid prison psychoses." Even with these the "differential" criteria excluding "hysterical" are conceived of as fluctuating and matters of careful inquiry and judgment.

These twenty and eleven case histories are given in considerable detail from all points of view and then schematically and psychologically arranged under the general heads of "Fight and Flight" reactions.

The general deductions drawn must be read in the original which constitutes a definite contribution to clinical psychiatry with some sympathetic inclusion of much material more elaborately dealt with by the Freudian school.

Kraepelin, E. ARBEITEN AUS DER DEUTSCHEN FORSCHUNGS-ANSTALT FÜR PSYCHIATRIE IN MÜNCHEN. Siebenter-Achter Bände. [Julius Springer, Berlin.]

In spite of all the difficulties, real and imagined, the Research Institute of Kraepelin's still functions, evidence of which is here presented in these two volumes of collected studies.

Volume 7 contains twenty-four original contributions and twenty-five communications, from Kraepelin, Kahn, Plaut, Neubürger, Spatz, Süner, Wuth, Halleworden, Scholz, Rüdin, Spielmeyer, Leury, Feuchtwanger, Mulzer, Kuenberg, Lange, Slanck, Merzbacher, and Gans—all names known in the literature of psychiatry. The titles show the wide variety of psychiatric interests covered.

Volume 8 contains four monographs: Wuth, The Physical Disturbances Noted in Mental Disease, already reviewed in the JOURNAL; Lange, Katatonic Symptoms in Manic Disease; Kahn, Heredity Studies in Schizoids and Schizophrenics—to be reviewed; Foersterling, Prison Psychoses—already reviewed.

Students of psychiatry will find in these collections much valuable material.

Plessner, Hellmuth. DIE EINHEIT DER SINNE. [Friedrich Cohen, Bonn.]

The thesis here developed began with Democritus. What he really knew about it has been lost. Protagoras, through the sarcasms of Socrates, has given us more of the teachings of Heraclitus, a pupil of Democritus. These were the ancient sophists, revived somewhat by John Brown, much disputed, and put definitely on the

modern map of science by Hering, Helmholtz, Stümpf and others. Kraus in his "General Pathology of the Individual" has developed the theme in terms of modern pathology as no other, attempting to bridge the gap between mechanists and vitalists, to which Haldane, among English thinkers, has contributed the most intelligently.

What do we know about anything? Is man the measure of all things? Is the individual only existent as a result of his sensory interplay? There are old problems, out of which theories of knowledge have sprung in bewildering complexity of statement—not the least definite and at the same time confusing, of which Kant's philosophical expositions are held preëminent.

This is the frame in which our author sets forth the type of problem involved concerning the solution of which we suspect that Jung, in his "Psychological Types," has made a definite contribution.

Indeed as we cut the pages of this intriguing monograph we see the kaleidoscopic scholarly interests of the author flashing over the whole field of modern philosophic discussion. The whole field? Not quite, for we miss the consideration of the "Unconscious," and suspect that a greater uniformity of conception would have been possible if the "mneme" in the narrower sense of Semon, and the broader aspect of Freud had been included.

The "Individual as a Whole," this is the implication of the "Einheit der Sinne," namely, the "Integration of the Nervous System" in an enlarged Sherringtonian conception, even more enlarged than "Loeb's" Tropism scheme, for Loeb was singularly oblivious to the "symbolic" tropisms that made "homo" man, and not a chained materialistic automaton.

The author stops with Kant. "Why stop there?" Kant knew nothing of the modern analysis of sensory receptor possibilities for the capture of cosmic energy. Hence his generalizations were most limited. Sight and sound, these are the chief modalities discussed by our author, but of all of the complex tropisms, of barometric pressure, gravity, inertia, and many others, there is little intimation of their activities in building up this billion year old mechanism, man.

We admire the erudition of this, shall we say desk philosopher, but we are not satisfied, in that he has not encompassed man in his complete biological interactionism.

Manoia, Romagna. I. DISTURBI DEL SONNO E LORO CURA. [Luigi Pozzi, Roma.]

This is a 200-page monograph on sleep, and its disturbances. It is but one of many treatises upon this extremely simple and yet at the same time very complex biological phenomena. The author gives us a very interesting summary of some of the notions. He omits most of the simpler ones and takes up the more debatable ones, endocrinopathic, toxic and other, to us, foolish aspects. The "mnemic" type of hypothesis is apparently unfamiliar to him. Semon is not quoted in his bibliography—and without a consideration of these fundamental conceptions no real understanding of the process is possible. Otherwise the discussion is purely anecdotal, as

we find most of the elucidations upon this universal type of process. Freud's general conceptions are mentioned, but there is no understanding of the contributions made by the psychoanalytic school. The chief value of these additions are necessary to understand the disturbances of sleep. Here there is no contribution. Otherwise the work is readable and interesting.

Lüdke, H., and Schlayer, C. R. *LEHRBUCH DER PATHOLOGISCHEN PHYSIOLOGIE.* [Johann Ambrosius, Barth, Leipzig. 35 mks.]

Krehl's textbook has been standard in this field for a number of years, but the advances have been so many that at the present time no single investigator is capable of mastering all of the fields in pathological physiology.

The present editors have therefore called in a number of collaborators, each known for their authoritative researches. Thus Franz Fischler writes the chapters on Metabolism; van den Velden on Constitution; Eppinger on Internal Secretions; Lüdke on Infection and Immunity; Leschke on Thermal Anomalies; Loewi on the Vegetative Nervous System; E. Förster on the Sensori-Motor and Psychical Systems; Rothberger on the Circulation; Faschbach on Breathing; Hans Hirschfeld on the Blood; J. Strasburger on Digestion; Lichtwitz on Nutrition, and C. R. Schlayer on the Renal Functions.

The whole makes up a volume of some 800 pages of standard monographic presentations in their respective fields. We have seen nothing in recent years as valuable as this work.

Dakin, H. D. *OXIDATIONS AND REDUCTIONS IN THE ANIMAL BODY.* Second Edition. [Longmans, Green & Co., New York and London.]

It is now some eleven years since the first edition of this valuable monograph appeared at which time it was highly spoken of in these pages. Since this time much progress has been made in unraveling the biochemical complexities attendant upon energy transformations going on within the human body, and the rapid advances being made in physical chemistry, in pure chemistry and related fields is making it more and more difficult to represent these fluxes of energy interchange by means of our present chemical nomenclature.

The author has very clearly evolved the whole situation and in this much-revised second edition given us a work of much interest not only to special workers in the field but to all neurologists who think of the organism as a whole and see it in its work of transforming the energy derived from the environment.

Rignano, Eugenio. *THE PSYCHOLOGY OF REASONING.* [Harcourt, Brace & Company, New York.]

This is another volume of the International Library of Psychology, Philosophy and Scientific Method, edited by C. K. Ogden, which has taken such a prominent and esteemed place among modern collections of scientific publications.

It is an excellent translation, by Winifred A. Hall. Rignano is

well known as professor of philosophy in the University of Pavia and also as editor of *Scientia*, a scientific periodical of international reputation.

We would expect from him a broad spirit of humanism in his dealing with the problems of reasoning and are not disappointed. It is gratifying to find a modern psychological work which boldly takes hold of the affective life as the substrate of the later arriving intellectual activities. Attention, Vividness and Connection are logical advances which lead from mnemonic affective patterns to What Is Reasoning? This is ingeniously compared to a series of operations, or experiments thought of. Here Mach's Theories of Knowledge are closely followed.

A very valuable chapter is that on the "Evolution of Reasoning." Here our author starts with Jennings' work on the *Infusoria*, and carries us forward rapidly through the animal phylum. Abstract reasoning flows out of concrete types of the "experiments" already alluded to; so also from Intuition to Deduction. The author's discussion of Intuition is very pertinent and satisfying. Symbolic or higher mathematical reasoning and mathematical logic are very clear and penetrating. The dialectic or intentional reasoner is set off a little too sharply, we believe, from the mathematical reasoner. The author's discussion of mind types can be read to advantage alongside of Jung's discussion of the same problem.

The Pathology of Reasoning chapters are not so satisfactory. The first on the dream is quite beside the mark. He evidently is not a clinical psychiatrist as his chapter on the psychoses evidences.

There is but one criticism and that is the author is a little old-fashioned. Ribot, Spencer, J. S. Mills, Jevons, and other types of thinkers are much quoted and we find the work very interesting as a historical résumé of older platforms.

N. B.—All business communications should be made to **Journal of Nervous and Mental Disease**, 64 West 56th St., New York.

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ORIGINAL ARTICLES

ON THE BASAL GANGLIA

By DR. G. VERCELLINI

LOS ANGELES, CAL.

Years ago, when the so-called "pure psychology" was accepted, the mental field was held as something absolutely independent of the body structure; but gradually the increasing knowledge of cortical phenomena has brought the problem to safer foundations. Lately the very exaggeration of endocrin deductions tried to take into its hands the explanation of many a mental phenomenon, and through the competition of the nervous theory, on one hand, and of the endocrin theory on the other, a stupendous progress was made in this study on a truly scientific basis.

With the progress of the physiopathology of the brain, and even more through the study of the endocrin glands and of their interrelation with the vegetative system, many facts have come to light in regard to the vegetative system which were either unknown or misunderstood thus far.

In spite of the increased knowledge, though, there still reigns in our mind a misconception, owing to which the vegetative system did not assume yet its due place, it is accepted as an accessory instead of being recognized as the natural leader of the general harmony of function in the organism.

Laignel-Lavastine, one of the pioneers of the new knowledge, expresses himself as follows: "The sympathetic functions are centrifugal as well as centripetal. These last constitute the substratum of *cenesthesia* (a condition which we may call *the mood of the organism*). The centrifugal control the contraction and the release of all the smooth fibers (lissomotor function) and the function of all the

glands." One can see how this generalization is very comprehensive in regard to the cenesthesia, perhaps even beyond his meaning. As regards the motor functions, the striated muscles as well as the nervous system of relation are totally excluded, but for their vaso-motor phenomena.

It will not be amiss, before we attempt any discussion on the subject, to see what anatomical structures belong to the vegetative in addition to the two gangliated cords and their white and gray rami and to the cranial and sacral autonomic systems with fibers from the III, VII, IX, X, XI cranial, and second, third, and fourth sacral. In regard to the sympathetic proper the following medullary centers are generally accepted: (1) A cellular group in the lateral segment of the cornu anterior; (2) a cellular group in the medio-ventral part of the same cornu; (3) a cellular group in the cornu posterior, constituting the column of Clarke and Stilling, which ends in the nuclei of Goll and Burdach. The first two groups represent the motor centers of the sympathetic proper, the third one the sense center.

In regard to the autonomic or parasympathetic system the participation of the cranial nerves necessarily implies the existence of corresponding centers in the medulla as well as in the mesencephalon.

Buscaino, in his "Biology of the Emotional Life," made an exhaustive abstract of the anatomical, physiological, and pathological findings in the central vegetative field. Experiments as well as diseases of the thalamus show in regard to mimic muscles dissociation between the voluntary innervation and the mimicry also vasomotor activity, action on the heart, on the temperature, on the pressure, on the respiration, on the stomach, on the bladder, and on the secretion of tears. Stimulation of the thalamus determines hyperthermia, while destruction of the thalamus provokes hypothermia.

From this exposition we see that nearly every vegetative function can be affected by abnormal function of the thalamus; yet we must keep in mind that *there is not "one" of these disturbances, referred to the thalamus, which cannot be also obtained by irritation or alteration of other basal ganglia.*

Irritation of the head of the nucleus caudatus when the action of the cortex is removed can determine in dogs all the phenomena of emotional mimicry; partial destruction of the corpus striatum allows spastic laughing and crying. Always independent of the control of the cortex tachycardia may be obtained as well as vasomotor hemiparesis and changes in the blood pressure through stimulation of the nucleus caudatus; motion of the stomach, cardia, and pylorus

through irritation of the n. caudatus and lenticularis as also increased intestinal motion, contraction of the bladder and erection. Increase of temperature can be had by alteration of the head of the n. caudatus and of the n. lenticularis, as also was found in man in a case of hemorrhagic cyst of the n. caudatus.

Through irritation of the floor of the third ventricle the rhythm of the heart and of the respiration can be altered, emotional manifestation of pain can be elicited, the pupil may be widened, and temporary glycosuria and polyuria can be brought about. Again, higher blood pressure can be provoked as well as contraction of the bladder, of the colon, and of the pregnant uterus, and also trophic lesions of the genitalia and secretion of sweat.

Huet found in rabbits—in the floor of the third ventricle—a group of cells symmetrically disposed around the median line. By removing the superior cervical ganglion (soon after birth) homolateral atrophy followed along the aqueduct of Sylvius in the wall of the third ventricle and in the corresponding half group of these cells.

Lesions of the corpora mamillaria may determine polyuria and irritation of the hypothalamus causes dilatation of the pupil, salivation, flow of tears, secretion of sweat and contraction of the bladder. Following lesions of the hypothalamus, the regulating power of the temperature is lost, even as a reaction to infection. Irritation and lesion of corpora quadrigemina impair the coördination in the motion of the striated muscles and also affect the rhythm of the heart and of the respiration. Furthermore, they induce changes in the blood pressure and in the movements of the stomach (vomiting), of the intestines, and of the bladder.

Since the action of adrenalin is identical with the action of the sympathetic, it seems opportune to quote here the experiments of Leschke, who, while by putting adrenalin in contact with the cortex never obtained any effect, through the slightest contact of adrenalin with the structures of the base of the brain always caused the instantaneous death of the animal.

Excepting the action of thalamus and of striatum in mimicry and of corpora quadrigemina in regard to coördinated motion of striated muscles, all the other symptoms quoted thus far belong to lissomotor and gland function only; but we shall presently see—in Wilson's disease as well as in the syndrome of paralysis agitans—quite a new field of vegetative function.

Referring to the lenticular degeneration, I shall quote the defini-

tion given by Wilson: "In pure, uncomplicated, bilateral lesions of the lenticular nucleus—more generally of the corpus striatum—provided they are of adequate duration, the clinical symptoms are bilateral, involuntary movements, practically always of the tremor variety, weakness, spasticity or hypertonicity (sometimes spasmodic contractions) and eventually contracture of the skeletal musculature; dysarthria or anarthria and dysphagia, and a degree of emotionalism; but without any alteration in the cutaneous reflexes. If the abdominal reflexes are absent (apart from muscular rigidity) or if the plantar reflexes are of the extensor type, then the syndrome is no longer pure. Constant cirrhosis of the liver, but no symptoms of liver disease in life."

The pathological findings, according to Wilson, are bilateral degeneration of the putamen and of the globus pallidus—especially of the putamen; sometimes the degeneration extends to the nucleus caudatus but the surrounding structure are not affected. Cirrhosis of the liver is neither of alcoholic nor of syphilitic type. There are certain secondary degenerations in the subthalamic region, but the pyramidal tract is not, at least primarily, affected, though it may show at times slight secondary changes.

The syndrome above quoted shows that *there are changes in the control of striated muscles due to degeneration of a center, which we have seen to control vegetative functions.*

Coming now to the syndrome of paralysis agitans, we must understand by it the true paralysis agitans as well as the Parkinsonian symptomatology often found after encephalitis lethargica. Hunt's findings would have a progressive degeneration of the pallidal system as the determining cause of the symptoms. Tretiakoff stands for a degeneration of the locus niger (which, by the way, according to Mirto, is simply a group of cells detached from the globus pallidus along the phylogenetic development), while O. and C. Vogt found lesions in the globus pallidus and in the nucleus caudatus, *i.e.*, (1) lesions in the neostriatum when the tremor is the dominant symptom; (2) lesions in the pallidus when there is more muscular rigidity than tremor. A. Souques, while not subscribing to the action of any one of these centers to the exclusion of the others, still accepts the evidence of a lesion in one or another of them as a causative factor. Moreover, he claims that said centers *must be accepted as motor centers as well as vasomotor centers, because of the several vegetative disturbances accompanying the Parkinsonian syndrome.*

One can add to these two syndromes the pathological findings of the chorea of Huntington, of double athetosis, and of Vogt's

"syndrome of the corpus striatum," *which all stand for abnormal tonicity and involuntary motions, as caused by lesions of the striatum.*

Owing to these motor and vegetative phenomena being ruled by same centers, we may ask ourselves whether *a center can be at the same time vegetative and motor*, though our anatomical and physiological findings exclude, to our knowledge, the duality of function for one organ. Even in regard to an apparently one and identical form of motion, the walking motion, for an instance, in spite of the coexistence of spinal as well as of cortical centers to control it, we realize that the fundamental mechanism of walking belongs to the spine (as shown in the phenomena of the spinal automatism described by Charles Foix and Pierre Marie), but that, on account of a more complex functioning (as the erect walking in man) superior centers come into play—the cerebellum and other subcortical structures—to control the lower ones; and that finally, in regard to the choice of a more differentiated walking motion, the dominating control is assumed by the cortex. In other words, with the evolution from a simple, automatic stepping to the complexity, let us say, of the motion of "the dance on the toes" successively more and more comprehensive centers assume the leadership, while the lower ones give up their "autonomy," *but without in any way giving to others their own characteristics.*

Should we now examine the sense field in regard to temperature, we would find that before reaching the thalamic station there are special nerves for cold and again other special nerves for heat, a condition which, in some lesions as high as the brain stem, may lead to dissociation between these two forms of sensibility. After reaching the thalamus a new regrouping takes place, directed to the cortex, owing to which the sensibility to temperature becomes "one" from extreme heat down to extreme cold. This new arrangement stands for the kind of temperature sensation which can consciously impress us, while about the peripheral and spinal sensibility nothing more can very likely reach our consciousness than a vague feeling not any more defined than that induced by heavy pressure in cases of syndrome thalamica. So, even for different forms of one kind of sensibility different organs are required.

Once the duality of function for one organ is excluded, let us look at *how these vegetative centers act on the motor field*, as this may lead us to the solution of the problem.

Professor C. Negro offers an explanation which applies to our case in his discussion on the phenomenon of the "cogwheel" found in Parkinsonian syndrome. This phenomenon consists in this, that

in such patients the flexion of the forearm on the arm—active as well as passive—instead of proceeding smoothly goes on by jerks, giving the impression that the cylinder of the trochlea were a cog-wheel, not a smooth surface.

“It is known [I am quoting from Negro] that the muscles of the vertebrate animals have a clonic and a tonic function, more or less equally represented, *i.e.*, have a mixed function. Professor Bottazzi, in a series of very interesting studies, confirmed by the experiments of Ioteyko, stated that the sarcoplasm and the myofibrille respectively correspond to the two functions. The tonic function is due to the sarcoplasm and the clonic function to the myofibrille of the striated muscles. Bottazzi's theory is nowadays accepted by nearly all the physiologists, who also attribute a sympathetic innervation to the sarcoplasm.

“The participation of the sympathetic to the innervation of the striated muscles is clearly demonstrated by the histological finding in such muscles—near the motor plaques of Kuhne-Ranvier—of terminal amyelinic fibers belonging to the sympathetic.

“The comparative physiology, on the other hand, also stands for the anatomical and functional complexity of the striated muscles. In most lamellibranchia there is in the same muscle a clonic function which determines the rapid shutting of the valves, and a tonic function added to the first to keep the valves closed. These two functions respectively belong to two substances of different structure which compose the muscular apparatus. Elective toxic actions can dissociate the two functions: valiva of the polypus, for instance, paralyzes the tonic function so the animal can still shut quickly the valves, but is no longer able to keep them closed.

“Coming to the human pathology, in Thomsen's disease there is a true pathologic dissociation of function between the two different elements of the striated muscles: to the normal, voluntary muscular contraction (corticomedullary) a tonic contraction follows of a longer duration than normal, which is due, not to the fibrillæ, but to the action of the sarcoplasm. Again, in Parkinsonian syndrome, due—according to pathological findings—to lesions of sympathetic centers in the mesencephalon, the muscular rigidity is connected with pathological hyperfunction of sarcoplasm.”

According to these data the striated muscle is a complex formation of two different structures, each endowed with a peculiar function of its own as well as under the control of a corresponding different nervous center. *The contraction of the sarcoplasm under the control of the vegetative system does not materially differ from the*

contraction of the protoplasma, worked by adrenalin, as seen in the reestablishment of the fallen capillary pressure through contraction of the endothelial protoplasma. It is well known that the action of adrenalin is identical with the action of the vegetative. As a consequence we can accept the action of the vegetative on the muscles as purely vegetative and as acting on one only of the muscular elements, which elicits "tonic action."

We have seen that the symptoms in Wilson's disease and in the Parkinsonian syndrome are caused by lesions of the striatum (or of the "locus niger," that is considered a derivation of the globus pallidus, which sends efferent fibers to it); therefore we can reasonably infer that the pathological hypertonic condition of the muscles or—more generally—the sympathetic control of the vegetative part of the muscles belongs to the striatum or to lower centers under its control.¹

It being so, our problem can be formulated as follows: *Since lesions of the striatum are to be accounted for the quoted syndromes, what kind of an interrelation there is between the cortex and the striatum to obtain—in a normal condition—the harmonious work of the two systems in the muscular contraction?*

Chatelin, in his study on the striatum, divides it in two portions: (1) Paleostriatum, which corresponds to the "globus pallidus," and (2) Neostriatum, which comprehends the "nucleus caudatus" and the "putamen." There is interrelation (to and from) between the neo- and the paleo-striatum, and has been found that but for this link the neostriatum would be a thoroughly isolated structure. In regard to the paleostriatum (globus pallidus), there are efferent fibers going (1) to the anterior part of the thalamus, (2) to the hypothalamus (corpus Luysii), (3) to the red nucleus, (4) to the locus niger, and (5) to the nucleus of Darkschewitch in the tegmentum. As regards the afferent fibers, the only connection of the corpus striatum with the neighboring centers is given by fibers from the thalamus to the striatum. *In this way even the cerebellum and the cortex can only be "mediately" connected with it, and "exclusively" through the thalamus.* Therefore we must look back for an explanation at the thalamic function.

¹ To avoid misunderstanding in regard to an apparent double function on the part of one organ, as would appear in that paper as regards the corpus striatum, it is well to state at once that, while the paleostriatum (globus pallidus) seems to control its functions—perhaps on account of two different kinds of cells—the neostriatum can be divided in two organs, i.e., "the putamen" for the vegetative function and the "nucleus caudatus" for the involuntary motions.

The anatomy of this organ shows that it is the end station of all the sensory tracts, and that furthermore, by reaching the thalamus, new and different regroupings of these tracts take place, with the effect of determining new forms of complex, more comprehensive sensations. The arrangement no doubt is intended for reactions of a more general order.

The studies of Dejerine, Roussy, Head, and Holmes on thalamic syndrome bring to our knowledge many interesting facts; yet we must not forget (1) that the chief lesion in this syndrome affects especially the "caudal portion of the lateral nucleus," or, in other words, "the interrelation between the cortex and the thalamus." Little is said of the possible lesions in its ventral subdivision, which receives "all the ascending sensory tracts from the tegmentum of the mesencephalon as well as fibers from the branchium conjunctivum (and red nucleus?)" ; (2) that in spite of the unilaterality of the lesion, in regard to the subjective symptoms felt by the patient, the function of the cortex can hardly be considered as exclusively monolateral. In fact, in regard to the symptom "temporary hemiplegia," we read that is found where there are also lesions of the internal capsule; so, since such lesions are still found at the post-mortem, we may infer that the apparent recovery had very likely been due to a suppletory function of the normal hemisphere.

The syndrome can be summed up as follows:

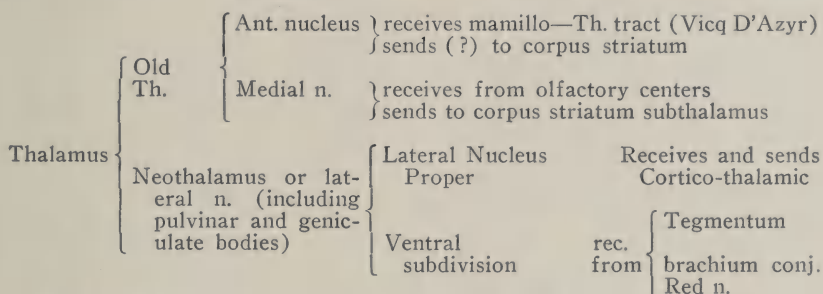
- (1) Slight temporary hemiplegia;
- (2) Superficial anesthesia persisting, organical, sometimes replaced by hyperesthesia, and always accompanied by well-defined troubles of the deep sensibility;
- (3) Slight hemiataxia and a degree of astereognosis;
- (4) Severe pain of the hemiplegic side, persistent, paroxistic, at times unbearable and resisting to any treatment.
- (5) Chorea-athetotic motions on the paralyzed side (Roussy).

From Head's discussion of this syndrome two points are brought out which seem to me of chief importance: (1) The deduction that—through the cortico-thalamic connection—an inhibitory control is worked by the cortex, owing to which, once this inhibition is removed, the thalamus is put in condition of permanent hyperactivity, and (2) the tendency, in this syndrome, to react exaggeratedly to pleasant as well as to unpleasant excitations.

Owing to this, as soon as an impulse is received, no matter how moderate, the effect is a strong sensation, quite out of proportion to the determining cause; in fact, the response to a pin prick may assume the characteristic of an emotional reaction. This peculiarity

no doubt belongs together with the painful generalized hyperesthesia found in such condition. Even more striking is the effect—quoted by Head—caused by musical hearing “on the affected side” and even of another patient, who (in regard to the pleasant feeling induced by the touch of the hand on his affected side) claimed that his affected side had become “more artistic” than the normal one.

But let us look at all the known connections of the thalamus with the neighboring centers (according to Ranson) in order to see if a better knowledge of its function can be obtained.



N. B.—To other efferent tracts are known: (a) Thalamus=olivaris; (b) Thalamus=spinalis.

According to a more recent scheme by Chatelin (1922), though, the anterior nucleus of the thalamus does not "send," but "receives" fibers from the corpus striatum, while its medial nucleus sends fibers to the corpus striatum. When we consider that the anterior and medial nuclei of the thalamus represent the old part of the thalamus, as found in animals, in which the cerebral cortex is not developed, so whatever cortico-like function is obtained must necessarily be worked by the striatum (globus pallidus), the double connection (to and from) between the striatum and the thalamus looks to me strikingly similar to the double connection (to and from) existing between cortex and thalamus.

Furthermore, it is very interesting the fact that, besides the thalamo-cortical and thalamo-striatic *efferent* tracts, there is only one more well-defined *efferent* tract from the thalamus, *i.e.*, the thalamo-subthalamic. (The thalamo-olivaris and the thalamo-spinalis tracts, of whose function nothing thus far has been discovered, will be mentioned at a proper time.) What has been found in regard to the subthalamic function is exclusively of "vegetative proper" nature.

The sensory function of the cortex, as shown in cases of cortical lesions, cannot be accepted as "sensory proper," but rather as an unemotional discriminative function to localize and bring to con-

sciousness the analyzed impression; so, from what has been said thus far, we can sum up our knowledge of the thalamus by saying: (1) That all the sensory tracts of the organism end in the thalamus, which consequently can be considered as the end station for the "sense proper," and (2) that the three *efferent* connections from the thalamus respectively end in three different fields of motion, *i.e.*, cortex for clonic motion, striatum for tonic motion, and subthalamus for "vegetative proper" motion (vasomotion, smooth muscles, glands, etc.).

According to the different data, quoted in the beginning of this paper, one might be led to believe that in the thalamus as well as in the striatum and other basal ganglia, there are centers for mimicry, heart motion, respiration, vasomotor, and other vegetative functions. Yet, if we stop to think that other corresponding centers are found for said functions from the medulla to the spine, we must either believe that the same function can be done indifferently by two or three different centers, or that—as already stated for other functions—some other associations of a superior order take place in these superior centers, owing to which the action of the lower ones can be either allowed or inhibited in order to obtain a more complex functioning.

Starting from the pyramidal system, which is better known to us, we find that the cortical lesion does not properly cause a true paralysis, but only disconnects the motor centers of the spine in one point of its sensory-motor channel, so voluntary motion cannot be obtained any more. The discriminative function of the cortex, which in man forms the link between sense and motion, through work of association releases or inhibits this or that lower center of motion to obtain the kind of motion required by the external impulse, as controlled by the body's condition.

Again, according to the observations of Wilson in the degeneration of the striatum, the hypertonicity is not directly given by the striatum, but, on the contrary, is obtained through the lack of function on the part of the degenerated striatum. In this way the striatum would be there to control the tonicity of the striated muscles, as created in the spine and distributed by the action of the cerebellum, so "the plasticity" of the muscular contraction were obtained. We know very well the importance of the "plasticity" when we realize that without it not only the intended motion is either totally prevented or greatly impaired, but that in such condition any other additional simultaneous motion is rendered impossible.

In regard to the thalamus (the end station of the sensory tracts)

a few more considerations are required. First, it will be logical to exclude from its attributions every and any motor function unless it were clearly demonstrated that there are absolutely no motor centers outside of it and under its control, doing the motor phenomenon, which can be obtained through excitation of the thalamus; otherwise we could just as well say that the "sense" nerve, which begins the reflex arc, is a "motor" nerve.

Second, by the general consent of pathologists and physiologists, "consciousness" is supposed to be, partially at least, a function of the thalamus, especially in regard to emotion. Buscaino claims that, while the subjective emotion belongs to the cortical function, the objective changes brought in the organism by the external impulse and revealed to us as "emotion" happen in the basal ganglia, so, to quote his words, "the cortex has the perception of a storm raging in the vegetative field."

The observations of Head and Holmes in regard to the thalamic syndrome stand for a form of indefinite consciousness on the part of the thalamus, especially as regards emotion; but we must not forget here that the thalamus syndrome refers essentially to interrelation between lateral nucleus and cerebral cortex, so nothing is said of the connections of the thalamus with the striatum and with the subthalamus. More than that, nothing either is said of the sensory tract arriving to the ventral part of the lateral nucleus. We can only conclude that, *once the cortex is disconnected, there is still some uncontrolled as well as indefinite emotional consciousness in the patient.*

Now, if we try to remember the discriminative function of the cortex, owing to which the sensibility as well as the motility are analyzed, or, in other words, that the cortex has an objective function, we can already state that *anything that is emotional in our organism does not belong to the cortex, and furthermore, that the thalamus is directly concerned with "emotion."* Head and Holmes say: "A pure cortical lesion leads to no change in the thalamic threshold to measurable painful or uncomfortable stimuli. *No greater dislike for either side.*"

Let us go a step ahead: From the phenomena of mimicry found in Wilson's disease appears that spastic laughing and spastic crying determined by lesion of the striatum—without any lesion in the thalamus—hardly ever are in harmony with the emotional condition of the patient. This finds its explanation in the exclusively motor nature of the striatum and lower centers under its control, which in the present case act, not through impulse from the thalamus, but through local irritative lesions or lack of inhibition. Further-

more, in the Parkinsonian syndrome, when the mimicry is totally prevented, but not the emotional feeling (coming from the thalamus), we see that, on account of the prevented mimicry, vasomotor phenomena take place when emotion is present. Remembering the three connections of the thalamus, we can infer that *whenever the cortical and the pallidal roads are blocked the reaction to a thalamic impulse becomes "vegetative proper"* (vasomotor or otherwise).

Considering the several new regroupings of the sensory tracts in reaching the thalamus (always in basis to the unity of function for each organ), we are brought to think that the thalamic sensory function—in its resuming all the others—is not expected to give again to our consciousness the impressions, as already detected by the lower organs. It must in its stead give a synthetic sensation, as vaguely shown in the indefinite sensation of the thalamic syndrome, where the lesion breaks the connections between thalamus and cortex. Now the only synthetic form of sensation known to us is pleasure or pain (I mean the plain feeling for which we cannot give any reason, as seen in idiocy). This causes the feeling of attraction or of repulsion and finds its extreme expression in laughing and crying. We must add to it that all the impressions of the cenesthesia also arrive to the thalamus, *i.e.*, the feeling of all the "vegetative proper" changes in the organism. All these things considered, we may sum up as follows: *We laugh and cry with the thalamus, while the cortex gives us the reason for our feeling.*

It is a fact of general knowledge that, beyond a certain limit, the more the feeling the less the clear cortical reaction, or, as Bianchi has it, "If emotion exceeds certain limits the greater intensity is at the expense and to the detriment of the intellect. The mental fields become restricted, the horizon obscure, the associative power enfeebled and the flows of ideas retarded." These words imply that, to have a clear, analytic (cortical) reaction, the sensory impression must not be too strong, otherwise the discriminative power of the cortex cannot take care of it: in which condition the reaction becomes mostly vegetative with a consequent new increase of emotion. This can be seen very well in the thalamic syndrome, where, the cortex being excluded, any slight impulse as soon as able to reach the thalamus assumes the proportion of an emotion. It being so, the control invoked by Head from the cortex upon the thalamus is not necessarily "a control of inhibition," but only "an effect of control" obtained through a complete reaction on the part of the cortex. The vegetative reaction, as obtained from lack of cortical function, determines a vicious circle, as it acts back on the cenesthesia,

which in its turn acts additionally on the thalamus. This *mechanism—in the thalamic syndrome—very likely brings to that condition of general paroxysmic pain which might be called “a thalamic epileptic attack or epilepsy of sense.”*

Now let us turn our attention to the phenomenon of mimicry, which we know to be under the control of the thalamus and by which we understand the expression of joy, sorrow, anger, or any other passion, as given by our mimic muscles. This phenomenon is so independent of the cortical control that in some cases of lesion in the internal capsule causing paralysis of the facies, there still can be obtained (through contraction of the otherwise paralyzed facial muscles) mimical manifestations under a proper excitation of emotion (thalamus). According to Bechterew, “The motions of emotional expression must be considered as pure reflexes, and the optic thalamus is the motor (?) center through which these inborn movements of expression are obtained: determined either by involuntary psychic excitation, as in emotion, or by reflex excitation of this center.”

Very important, to clear this point, is the case of Schrottenbach, in whom with hemiparesis, hemianesthesia, mimic paralysis, and hemianopsia there were several vasomotor disturbances and irregularity of the psychoreflexes either absent or paradoxical in the affected side. In a few days, following the disappearance of the hemianesthesia and of the mimic paralysis, the vegeto-emotional disturbances also disappeared, while hemiparesis of voluntary motion and hemianopsia persisted. I quote this case because in its clearing it shows the independence of the mimicry from the control of the pyramidal tract, and at the same time shows the parallel behavior of mimicry and of vegetative symptoms. Therefore we can deduce (1) that, since the mimicry can also be obtained through the excitation of the striatum (motor), there is no reason for attributing this motor function to the thalamus, as Bechterew would have it; and (2) that through the mimic paralysis and the vegetative disturbances the two connections of the old thalamus (anterior and medial nuclei) with the striatum and the subthalamus appear manifest, *i.e.*, we find the complete motor and vasomotor channel of phenomena as seen in lower forms of life. An everyday demonstration of the independence of mimicry from the cortex is given by our more or less successful voluntary (cortical) effort to control our own mimicry brought about by either mirth or pain.

If we stop now to examine the nature of the mimic motion, we realize that mimicry is given by the harmonious work of some groups

of muscles which, under a given stimulus (pleasure, sorrow, or other), always enter in action exactly in the same corresponding way. It being so, they can logically be classified with the automatic movements, which also have the characteristic of being necessarily stereotyped. Now, since mimicry is obtained through the play of the extrapyramidal tract, I do not see why the automatic movements (which also at times persist after pyramidal paralysis) should not be ruled by the same extrapyramidal control. Let us examine for a demonstration the mechanism of repeated motions, like that of going down a certain number of even steps of a staircase. Everybody must admit that the beginning of this series of motions is directly under cortical control; but when through the repetition of several steps of the same height we become used to that kind and amount of repeated, even motion, the following ones do not require any conscious act of will or attention until the end of the stair is reached. Of course, were any of the subsequent steps of a different height, a new positive cortical act of control would again be required. One might say that the cortex sets us going at a certain rate, after which it leaves the thought of it to some lower center, keeping only a sort of negative control on the whole process. The synergic motions give another instance of extrapyramidal motion, because, even when one of the two symmetric muscles does not enter in contraction, its chronaxia (according to Bourguignon and Lapique) becomes identical with the chronaxia of the symmetric muscle in action; and it is known *that to same function the same chronaxia corresponds*. In other words, the vegetative changes leading to motion have taken place equally in both muscles and the unmoved muscle would have followed the motion of its symmetrical but for some intervened inhibition (cortical).

The great handicap to the understanding of this mechanism is caused by our being the slaves of the tradition of cortical localizations and consequently of cortical centers for motion. But if we realize that the action of the cortex is only an analytic function of release or of inhibition (as it has been so well demonstrated by Wilson in regard to its old representative, the striatum, in regard to tonic function), and that the real motion is a function of lower centers, then *the automatic movements would be readily accepted as directly obtained through the action of the thalamus on the striatum and through it on the red nucleus, which is recognized as the head station of the extrapyramidal tract*. In this way also the function of the two paths from the thalamus, one to the oliva and the other to the spine, would find its explanation in some forms of motor

reaction more or less unconsciously performed. If we remember now, (1) that through excitation of the striatum (which is only a unit, morphologically speaking), besides the tonic action of plasticity in muscular retraction, other more differentiated movements can be obtained even in man, and (2) that the full mechanism of fairly differentiated motions is exclusively obtained through this path in those lower animals, in which hardly any or no neopallium at all is to be found, then these phenomena will appear quite natural to us.

To see in all its successive steps the sensory-motor function, as controlled by the thalamus and executed by the motor apparatus in all its three manifestations (*i.e.*, pyramidal, striate, and vasomotor), let us take the instance of a boy who "tries to write with as good a handwriting as he can possibly afford." The boy, of course, is supposed to be normal, and yet, in spite of it, we will notice that—at par condition—his hand is not so steady as the hand of a fully grown man.

This condition is probably created by the not yet reached harmony of teamwork between the still progressing functional development of the cortex and the already perfected vegetative function of the striatum. The counterpart of it is seen in the tremor of old people, when the cortex is still normal, while the vegetative function begins to be impaired. We know besides that, when it comes to a very delicate performance, the harmony between these two systems is hardly ever well balanced, and there is always a moment when the tremor manifestations are obtained. The chorea of young people, as well as their propension to make more or less hideous faces, may be traced from this very condition.

With the exception of this unsteadiness, if the boy is alone and is not afraid of eventually spoiling one or more sheets of paper, the process will get along satisfactorily and his only conscious feeling will be that of a certain degree of attention. Let us now suppose him with only one sheet of paper, so if it were spoiled everything would go wrong. Then he would work with an exaggerated amount of tension, *i.e.*, he would become "nervous," with the result of rendering his performance more difficult than it really is. In other words, too much sensation would reach the thalamus (as compared to the amount of sensation needed for the cortical discriminative function), with the effect of creating phenomena of diffusion, shown by less efficiency on the part of the strained cortex. As a natural consequence the cortico-thalamic fibers would send inadequate impulses to the thalamus, and through it, first, to the striatum, with

the effect of tremor, and second, to the subthalamus, with the result of perspiration or flushing of the face.

Let us go a step further and suppose that somebody comes to look critically at the performance: then his "nervousness" would increase to the extent of rendering of very little value, if of any, his cortical discriminative power; and he would therefore get either angry or cry, *i.e.*, he would undergo a complex striato-vasomotor manifestation of mimicry and of vasomotor changes. Suppose, again, that he were not daring to show his feeling and give vent to his passion, then a more intense vasomotor manifestation would occur, which "organically" would stand for the full reaction.

Anatomically speaking, we had, (1) an impulse (normal) reaching the ventral portion of the lateral nucleus of the thalamus: efferent thalamo-cortical fibers brought this amount of impression to the cortex for discriminative purpose, after which the cortico-thalamic fibers brought back to the thalamus the analyzed impulse. (2) The thalamic fibers from the lateral nucleus ran toward the medial nucleus (Ranson) to reach striatum and subthalamus: the first to modify the tonicity and probably other motor manifestations according to the well-defined amount of motion needed, and the second to supply the right amount of change in the circulation, to supply the need of the motion. Owing to the "nervousness" induced in the first case we have seen that the wrong cortical function caused abnormal striato-vasomotor reaction, while the second case of "greater nervousness" determined a wholly "vegetative proper" reaction.

From this example we realize how strictly connected these three forms of motion are, and how—whenever any of them is prevented from entering into play—the other ones do a supplementary amount of work in order to obtain a full "organic reaction" instead of a "functional one."

It is evident that the cortical function, though linked with the other two, has a degree of well-defined independence. The phylogenetic evolution shows that the part of the thalamus which receives the impressions from the body and sends them to the cortex, from which they come back analyzed to the thalamus, is, in a way, superimposed to the old thalamus (anterior and medial lobes). Therefore, instead of having through the old thalamus a direct reaction to an impulse from our sensory organs, through this new mechanism the reaction is modified by the analytical function of the cortex. As regards the striatum and the subthalamus, they are both closely linked together, as, while the striatum stands for the tonus and the

extrapyramidal stereotyped motion, the subthalamus stands for the circulatory changes needed to supply the motion. Now this is what happens: while with a thorough normal cortical function both striatum and subthalamus receive an adequate impulse, and accordingly have a normal reactional function, when the cortical play is at fault both the old thalamic functions are impaired. The striatum and subthalamus are supposed to work together, but if for any reason the striatum does not work, then the whole stress of the reaction is thrown upon the subthalamus with the effect of an organical (but not functional) reaction to spend the energy of the received impulse. The trouble is that this kind of organical reaction creates a vicious circle, because the "vegetative proper" changes (determined by this suppletory reaction) induce through the vasomotors a new condition of feeling in the organism, which in its turn reacts back on the thalamus. In this way the thalamus, instead of becoming "unloaded," becomes more and more "loaded" through these "vegetative proper" changes.

But let us back to the subject. In regard to the effect of the vegetative proper changes in our organism we must realize that there is all the time a certain amount of such an effect acting on our sensory organs, and we call it "cenesthesia." This condition, absolutely speaking, is to be accounted for the greater or lesser amount of freedom in our reaction field; and according to the kind of our pre-existing feeling (pleasure, sorrow, or otherwise), is responsible for our choice of reaction. In other words, while the external impulses lead us to react, our way of reacting (choice of reaction) depends to a great extent upon our cenesthesia, determined, as we said, by previous not wholly reacted external impulses.

In regard to the effect of the cenesthesia, I wish to add a remark.

NOTE.—This triplex connection, and especially the connection of striatum and subthalamus, through its effect on the cenesthesia (and consequently on the metabolism) may lead us to find the reason for some localizations of symptoms. Take, for instance, the condition of the liver in pallidal degeneration: if we think of the condition of steady muscular hypertonicity and we connect such condition with the function of the liver in sugar metabolism as regards muscular work, with the tremor in fatigue and finally with the sugar-freeing action of adrenalin against fatigue, would it not seem more probable an action of striatum on the liver, than a hypothetical action of a not less hypothetic toxin from the liver on the striatum? Of all the other liver diseases not one causes changes in the striatum, while changes in the liver are found in the Parkinsonian syndrome and changes in the muscular tonicity and eventually in the liver are found together in chronic alcoholism. That these changes in tonicity can be referred to the function of the striatum is readily seen, when—the cortex being yet apparently normal—there is a condition of tremor which gives way to a dose of alcohol sufficient to excite the dulled thalamus, so it can act adequately on the striatum.

What brought me to write this paper has been the peculiar action of two hypnotics: Trional and Luminal. The satisfactory action of the first in chorea of Sydenham and of the second in epilepsy as well as in asthma (as I had the pleasure of seeing in several patients of Dr. Geist, who, to my knowledge, first used it in asthma) was a new light to me. Epilepsy is accepted as a cortical syndrome, chorea as a syndrome of the striatum, and asthma as a vegetative proper syndrome, or, in other words, we find here, affected through hypnotics, the three connections of the thalamus with the motor centers. Maragliano, by keeping Parkinsonians in bed, far from any noise or other external excitation, and in subdued light, obtained a temporary stop of their tremor, *i.e.*, by reducing the sensory impulses was able to stop a symptom of the striatum connected with the thalamus. Again, under the repetition of a monotonous sound, which is likely to dull our sensibility, we are driven to sleep, and, on the other hand, when we feel very sleepy and do not want to fall asleep, we try to keep awake by pinching ourselves or by inducing some other form of sense impulses; and furthermore, if very tired, our sensibility is greatly reduced, so it takes quite an excitation to keep us awake. The drunkards, whose sensibility is dulled, show all the degrees of sleepiness and of sleep even to phenomena of somnambulism. It will not be amiss to remember that, no matter how sleepy, pleasant or painful news effaces our sleep for the time; and that, whenever under the stress of conflicting thoughts, *i.e.*, when instead of reaching a cortical solution we are confronted by emotional feeling (thalamic), it takes very long to get asleep.

Putting together all these observations, it occurred to me that the named hypnotics very likely act on the thalamus, or, more generally, that our sleepiness or wakefulness may depend upon conditions of the thalamus (emotional); and I was very pleased when I read Economo's report on encephalitis lethargica at the last Congress on Internal Medicine held in Vienna (1923). "We have learned," he says, "that sleep (and wakefulness) is controlled by a center situated between the optic thalamus and the hypothalamus."

From the present discussion the following conclusions can be drawn:

(1) That the function of "tonus" is a purely vegetative function under the high control of part of the striatum. Its normal function gives the required plasticity to the contraction of the muscles and its partial or total lack of control is shown from the impossibility of a complete relaxation (to catalepsy[?]) to tremor and rigidity.

(2) That the other part of the striatum and lower centers con-

nected with it (in addition to the general tonic function) must (also) control the automatic or in any other way stereotyped movements, as this system represents the highest motor center in those low forms of life where there is no cortical function. It is simply another instance of loss of independence on the part of a center which otherwise sticks to its functional characteristics. One might compare the human striatum to a horse which had found its rider. The horseman has the leadership, but the motions are horse's motions and not of the rider.

(3) That the thalamus is exclusively a sense organ, and that through its three connections (with [1] cortex, [2] striatum, [3] subthalamus) are obtained in line of motor reaction, respectively, voluntary motions, tonus and automatic motions, and "vegetative proper" motor phenomena.

(4) That the true place for localizations is the spine as well as the medulla, while the superior centers do not act as real motor or sense centers, but purely as fields of association, with the result of either release or inhibition on lower centers.

(5) That through the vegetative nature of the basal ganglia the action of the endocrin glands on the nervous system can be readily understood.

PARKINSONIAN SYNDROMES IN ENCEPHALITIS LETHARGICA AND IN PARALYSIS AGITANS

CONSIDERATION OF THE CLINICAL AND PATHOLOGICAL DIFFERENTIAL DIAGNOSIS*

BY ALFRED GORDON

Parkinsonism after an attack of lethargic encephalitis sometimes resembles paralysis agitans more or less closely, especially in those cases that last a long time. In spite of this apparent resemblance it is difficult at present to ascertain whether the encephalitic syndrome is apt to pass gradually into a slowly progressive typical paralysis agitans. It is always instructive to study and compare Parkinsonism originating from the two different sources. The following three examples are presented here for this special consideration and discussion:

Case 1. M. P., female, thirty-five years of age, presented several months ago an acute symptom-group (gathered from her relatives) strongly suggestive of encephalitis lethargica, viz., fever, somnolence, and strabismus. These symptoms gradually subsided and rapidly hypertonia of the muscles of the face and arms developed.

When she first came under observation (about six weeks ago) she complained of considerable headache and especially of stiffness in the muscles of the neck and throat. She presented the mask-like facies more pronounced than it is at present, stiffness of the entire musculature of the body, a fixed attitude in standing, walking, sitting down, or getting off a chair. The steps were small, but what was particularly striking is the inability to sit still: every few seconds she would get up and walk across the room once or twice, saying she could not control herself. There was loss of automatic movements. Her movements of the arms and legs were exceedingly slow and limited. There was considerable resistance to passive movements. Muscular fatigue was much pronounced: upon the least exertion she would feel exhausted. There was a tendency to an indefinite preservation of any given attitude. The trunk is habitually in slight flexion and this flexion is easier than extension. The rigidity affects more the upper than the lower extremities. The elbows are kept slightly away from the body. The forearms are slightly flexed. Small movements of the hands, such as buttoning or picking up a fine object, are poorly carried out.

The face, fixed, mask-like, has a suffering expression: the mouth

* Presentation of three cases at the meeting of the Philadelphia Neurological Society, December 21, 1923.

slightly open; the lips immobile; the mimicry reduced; the look fixed; blinking is rare; the look appears wide awake; the patient seems to speak with her eyes.

There is a very fine tremor which is neither constant nor especially characteristic; it is slight, discrete, and intermittent. In the beginning of her disorder one could hear her foot executing the so-called pedal movement: the toes being on the floor, the heel would rhythmically strike the floor for many minutes in succession.

When the patient speaks, she hardly moves her lips, the voice is low and monotonous, the phrases are brief. Sometimes she speaks very fast by repeating several times the same word or phrase. Willingly she avoids speaking, but her mutism is intermittent and the least emotion brings on a flow of language. The speech is automatic. Laughing is difficult.

Among other symptoms may be mentioned excessive salivation, flushes of heat, red patches on the face and forehead, pronounced sweating of the hands and feet.

The patellar reflexes are somewhat exaggerated. Sensations are preserved. The pupils and the eyes in general are normal. The sphincters are not disturbed. The mentality is intact.

The salient features of the case are, therefore, the predominance of hypertonia over the tremor, which is very fine, slight and not at all identical with that of the classical paralysis agitans; the onset of the hypertonia in the facial region; the early appearance of the speech peculiarities; finally the presence of the vasomotor disturbances.

Case 2. M. R., male, about sixty-two years old, commenced his paralysis agitans several years ago with a slight tremor of the right hand. Gradually the hypertonia, the characteristic attitude in standing, sitting down, or getting up made their appearance, so that in a few years the characteristic clinical picture became complete. He now shows the typical tremor of the hands, mask-like facies, widely opened and staring eyes, tendency to fall forward in walking, generalized hypertonia and loss of automatic movements.

Case 3. D. B., man of fifty-nine years of age, also began his paralysis agitans a few years ago with general weakness and tremor in the right hand. Presently he shows a passive tremor of both hands, generalized hypertonia, the body slightly bent forwards. In walking, sitting down, or getting up the body is kept fixed. The facies is mask-like. The speech is monotonous, sentences are brief. Anteropulsion is present. The patient constantly complains of feeling weak. He gets easily tired upon the least exertion. The eyes are staring. Lately he developed a bilateral nystagmus on lateral movements of the eyes. There are no other ocular disturbances.

In comparing the clinical pictures of the case with the encephalitic onset with the other two in which the Parkinsonian symptoms developed gradually, at first glance one is impressed with a certain similarity, but a closer analysis reveals certain differences. First of all, in

the former we find a predominance of hypertonia over the tremor. In the latter the tremor is the predominant feature. In cases of paralysis agitans without tremor the diagnosis may be somewhat embarrassing, but again a closer inspection will reveal this fact, that in the encephalitic Parkinsonism the hypertonia is chiefly and strikingly so affecting the facio-cervico-brachial region of the body more than the rest of the body. In the classical paralysis agitans the hypertonia is uniformly spread all over the body. The facies in the three patients also presents some evidences of difference. In the encephalitic case the orbits are not widely open and the face has not the frightened appearance which are all found in the classical paralysis agitans. In the first the face gives the impression of suffering, in the latter that of fright, surprise, and anxiety.

The tremor in the encephalitic case is slight, fine, rapid, and fugacious, horizontal or vertical; in paralysis agitans coarse, not rapid, constant, and pill-rolling in character.

Anteropulsion movement is absent in the first, but present in the latter.

The first patient complains of a painful and persistent stiffness of the neck, increased salivation, a sense of suffocation, and obstinate headache. These symptoms are rarely or at all observed in paralysis agitans.

Speaking generally, and taking into consideration the large number of cases of encephalitis with the great variation in the sequelae, we find that in association with the hypertonia simulating that of paralysis agitans other excitomotor symptoms have been observed, such as choreiform twitchings, myoclonus, bradykinetic movements of great amplitude of one or two extremities on one side, finally localized facial or cervical movements. All these phenomena may arise at various stages of the disease, either at the onset of the illness or weeks and even months later. All these phenomena are usually not observed in paralysis agitans, so that the differential clinical diagnosis may be established without great difficulty.

If we, on the other hand, look for an explanation in the pathology of encephalitic Parkinsonism and that of paralysis agitans, the difficulty in the differentiation cannot be so readily overcome. Encephalitis lethargica has for an anatomical basis lesions of the basal ganglia and the nuclei of the mesencephalon. The gray matter in the subthalamic region, locus niger, thalamus, and the striatum is particularly involved. In the ordinary paralysis agitans lesions have been equally found in the basal ganglia. Mingazzini, for example, reports a case in which a cyst involved the caudate nucleus and a part of the

lenticular nucleus. Others have found in paralysis agitans involvement of the fibers connecting the lenticular nucleus to the mesencephalon and subthalamic region. Hunt considers the affection as the result of a lesion of the striatum. Vogt regards the disease as an involvement of the globus pallidus of the striatum.

It is therefore evident that the anatomical substratum in the two affections is similar, if not identical, as far as the localization is concerned. It is around and about the striatal neurone system that the lesion is focused. The clinical differences observed are only a matter of degree or intensity as far of course as the hypertonia and tremor are concerned. In the ordinary paralysis agitans the course is slow, progressive, and insidious. Anatomically such a condition would correspond to a gradual degeneration and subsequent atrophy of the neurone system of the striatum. Indeed, Hunt speaks of atrophy of the cells of the striatum; Jelgersma equally speaks of atrophy of the radiations of the lenticular nucleus. On the other hand, encephalitis lethargica is an acute infectious disease attacking the vascular supply of the mid-brain as well as other portions of the central nervous system. While the selective action of the virus of the disease is on the cells of the basal ganglia, nevertheless many other areas from the cerebral hemispheres to the spinal roots, including cranial nerves, may be involved. The latter explains the polymorphic character of the disease, which clinically is manifested by a great variety of symptoms.

The pathological anatomy of the encephalitic Parkinsonism and of that in paralysis agitans is similar with regard to localization, but dissimilar in character. In the first case it is at first of an irritative nature; in the latter of a chronic and progressive nature and atrophic in type. Herein perhaps lies the slight but nevertheless distinct difference in the few clinical manifestations common to both affections as described above.

THE USE OF BISMUTH PREPARATIONS IN THE TREATMENT OF TABES DORSALIS AND PARESIS *

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AND

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During the past year we have treated fifty-five unselected cases of neurosyphilis with bismuth, including twenty-three cases of tabes dorsalis, ten cases of paresis and taboparesis, and twenty-two cases of cerebrospinal syphilis. These cases have been observed for a period ranging from four months to a year following treatment, and we wish to make a report of our results obtained in the cases of tabes dorsalis and paresis.

Balzar (1) first experimented with bismuth as an anti-luetic in dogs in 1889. Because of the production of severe enterocolitis and stomatitis its use was discouraged. In 1916, Sauton and Robert (2) resumed investigations by observing the effect of sodium and potassium tartro-bismuthate in spirillosis of hens. They reported favorable results. Sazerac and Levaditi, (3) in 1920, obtained similar effects with this compound in rabbit syphilis, and proved that bismuth has definite spirocheticidal action. Their work has later been confirmed by Klauder (4) and Hopkins. (5) Intravenous injection of the drug was highly toxic, but given intramuscularly, large doses were well tolerated; but in man the tolerated dose per kilogram is much smaller than the sterilizing dose per kilogram for the rabbit. (30)

The first clinical tests were made by Fournier and Guenot, (6, 7, 29) who obtained specific effects in all stages of syphilis. Since then bismuth has been extensively used, with beneficial results, on the primary and secondary manifestations of the disease.

Comparatively little has been written of its use in neurosyphilis. Ten cases of paresis and ten cases of cerebrospinal lues were treated by Marie and Fourcade (8) with little improvement in advanced paresis, but rapid improvement in gummata and arteritis. Fournier and Guenot concluded that bismuth was the anti-luetic of choice in

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neurosyphilis. They obtained marked relief in tabetic pains and crises and other subjective symptoms. Evrard,(9) in a case of paresis, obtained considerable improvement; speech disturbance disappeared and tendon reflexes returned to normal. Artom,(10) in seven cases of *tabes dorsalis*, noted improvement in the pains and ocular disturbances, while in three cases of paresis there was no change. Golay (11) concluded from its effect on *tabes dorsalis* that bismuth was of special value in neurosyphilis, especially in cases in which mercury and arsenic had been ineffective. Vialard (12) obtained a clinical cure with bismuth in a case of meningo-radculitis which had been resistant to mercury and salvarsan. Etienne (13) highly recommends bismuth in neuro- and vascular syphilis. Boesch (14) used bismuth in seven cases of *tabes dorsalis* with relief of the symptoms and arrest of the disease. Pain, gastric crises, and incontinence were especially improved. In a case of acute myelitis, reported by Benech,(15) cure was rapidly effected with bismuth. Souques, Blamoutier, and Massary,(16) in a case of cervical pachymeningitis, with blocking of the spinal canal, obtained complete clinical and serological cure with bismuth. The spinal fluid at first showed a Froin syndrome, and it became entirely normal. Tixier (31) reported a case of hereditary lues, with convulsions, which was cured with bismuth.

ADMINISTRATION

We gave intramuscular injections one to three times weekly, according to the tolerance of the patient, arbitrarily choosing twelve injections to comprise a course of treatment, followed by a rest of two months, when a second series of twelve injections was given some cases. The rate of absorption can be accurately traced by means of the X-ray. The dosage we administered was apparently not completely absorbed for seven to ten days. Cases returning two months after the completion of the first series showed no remaining unabsorbed bismuth in the buttocks. A case returning six weeks after completion showed slight residue of previous injections.

REACTIONS

It has been shown that bismuth is excreted in the saliva,(17, 24) urine,(17, 24) bile,(7) and sweat,(7) and rapidly passes into the spinal fluid.(17, 7) Our results agree with most others reported in the relative nontoxicity of bismuth. There was no general reaction in any case. In four cases of the fifty-five treated there was slight local pain following the first few injections. With these cases there

was considerable local induration, but by diminishing the frequency of injections this promptly subsided. Rarely an oily cyst forms locally which terminates by resorption.(7) Others have reported this local reaction, which occurs less frequently if the patient remains quiet for a while following the injection. Fournier and Guenot in 1,500 injections did not encounter any serious accident. They noted only occasionally slight fever and polyuria. In a case of Sterne's(18) a cutaneous reaction developed and also a case with prostatic symptoms, as swelling and pain, which he thought due to the bismuth. In both cases the symptoms disappeared upon the cessation of treatment, but recurred upon further injections in the case of the prostatitis. Gougerot (19) also noted a cutaneous reaction in the form of an exfoliative dermatitis. Simon and Bralez (20) reported a case of optic neuritis and one of meningomyelitis, both developing while the patients were receiving bismuth treatments. Whether these reactions can be attributed to bismuth is uncertain. Milian (30) mentions asthenia and an acute syndrome comparable to mercurial colic with toxic doses.

Many of the writers advise caution in the use of bismuth in any case presenting signs of renal disturbance. However, Emery and Morin (21) reported two cases of syphilis with chronic nephritis in which the bismuth did not aggravate the nephritis, but, on the contrary, the albuminuria diminished. They concluded that signs of renal irritation during treatment are to be explained as a Herxheimer reaction, an infectious process from coincident stomatitis, or a luetic nephritis, and not due to bismuth. In one case of Simon's,(22) after four injections symptoms of nephritis developed, disappearing spontaneously, and not recurring on further treatment. He considered it a Herxheimer reaction. Gougerot regards the nephritis as due to excretion of bismuth plus infection, secondary to the stomatitis. Felke (23) believes that bismuth produces renal damage which is manifested with little or no albuminuria, but chiefly by numerous epithelial casts, and advises sediment examination. In none of our cases did albuminuria or clinical signs of renal insufficiency appear.

By far the most frequent accident is the occurrence of stomatitis. The clinical and histologic characteristics of bismuth stomatitis have been carefully described by Milian and Perrin.(24, 25) It may vary in degree from a simple bluish line about the gingival margin of the teeth to circumscribed pigmented spots, gingivitis, superficial erosions, or ulcerations. Histologic examination showed simply a deposit of the bismuth in the endothelial cells, entirely beneath the epithelium and associated with vascular dilatation. They also state that the

bismuth is later reabsorbed, and even the severe forms, with the cessation of the injections, pursue a benign course. In their experience a simple bismuth line occurred in 100 per cent of cases receiving twelve injections. They found that stomatitis was much less frequent if injections were given every third day instead of every second day.

We believe oral hygiene is an essential adjunct to treatment. Those in whom the teeth had been extracted, or in whom there were no signs of pyorrhea, showed no evidence of oral complication. Those with pyorrhea suffered varying degrees of stomatitis. Seven cases developed a blue line, chiefly around the central incisors. This usually appeared after six to ten injections and gradually improved with the use of antiseptic mouth washes, together with the establishment of rigid oral hygiene. It was not considered a contraindication to treatment, and the injections were continued without an advance in the stomatitis. In five cases a more severe stomatitis developed, with soreness of the gums, increased salivation, marked fetor and bluish areas of superficial erosion of the buccal mucosa. In all these cases treatment was temporarily discontinued, and antiseptic mouth washes used with complete relief in two to four months. In the latter group marked pyorrhea and abscessed teeth were present at the institution of the treatment.

TABES DORSALIS

Among the twenty-three cases of tabes the duration of the disease in eight was under two years, in nine from two to five years, and in six over five years. The objective neurological findings in all cases remained unchanged except for the improvement in gait. However, the influence on the subjective symptoms was marked.

Tabetic pains were relieved in the majority of cases, regardless of the duration, and ameliorated in all others except two of long duration. Of the eight early cases, pain was prominent in six, with complete relief in four and improvement in two. Of nine cases of two to five years' duration, pain was present in seven; it disappeared in two, was relieved in four, and was unaffected in one. Of the six late cases, pain was complained of in all, five of which were completely relieved, and one was not improved. Relief of pain began after four to six injections. Numbness of the feet was a symptom in five cases and was completely relieved in four and improved in one.

Urinary disturbances were present in two early cases and were completely relieved. It was a complaint in seven late cases, with

improvement in four and no change in three. Difficulty in walking was present in five early cases, three of whom were markedly improved and in two there was no change. Of the late cases, ten showed marked ataxia, which was partially relieved in five but there was no change in the others. Of those improved, four were hardly able to stand before treatment, but all could walk by the conclusion of treatment. No exercises or reëducational measures were employed.

We believe optic atrophy is not a contraindication to the use of bismuth. In cases with marked visual impairment there was subjective improvement in all cases, but objective improvement in only one case of optic tabes. In no cases did the atrophy appear to progress during the treatment. Herman,(26) from an experience with eight cases of optic atrophy, concluded that bismuth gave the best results of all forms of anti-luetic treatment in such cases. He obtained marked improvement in vision and also changes in the appearance of the ocular fundi.

PARESIS AND TABOPARESIS

Of the ten cases of paresis the duration of the symptoms was under one year in four and over one year in six. One had had considerable previous anti-luetic treatment. Pain, which was a complaint in three cases, was relieved in all of them. Incontinence of urine in two cases was almost completely relieved in both. The early cases were improved subjectively, but there was no change in the memory or mental condition.

In one case a remission occurred, apparently induced by the treatment. His subjective complaints were relieved, his irritability and mental sluggishness improved, so that he was able to handle his business successfully. His euphoria was not apparent after treatment. The other late cases showed no change in mental symptoms but showed improvement in their physical condition.

SEROLOGY

In early lues marked serological improvement has been reported following bismuth treatment, the blood Wassermann frequently becoming negative. Nathan and Martin (27) obtained a variation in the blood Wassermann in 80.8 per cent of their cases of primary syphilis. However, such is not true of neurosyphilis. Kohen (28) obtained a negative Wassermann reaction on the blood by the use of bismuth in two out of three cases of paresis which had formerly been positive. In the other case the blood Wassermann changed from negative to positive. The spinal fluid Wassermann in his cases

remained unchanged, although the cell count and Pandy reaction were diminished. Artom (10) found in seven cases of tabes dorsalis no change in the blood or spinal fluid Wassermann, but some reduction of cells and globulin content. Marie and Fourcade, (8) in ten cases of paresis and ten of cerebrospinal syphilis, also found no change in the blood or spinal fluid Wassermann. Others, at most, only report a slight diminution in the Wassermann reaction on the blood or spinal fluid in neurosyphilis.

Our findings essentially agree with the above. The blood Wassermann was unchanged in most instances. There was a reduction in five of the group of thirty-three cases. Of the early tabetics one was reduced from 4+ to 2+ and one from 4+ to 3+. Of the later tabetics one was reduced from 4+ to 1+ and one from 2+ to 1+. Two others were reduced from 4+ to negative after twelve injections, but became 4+ again with further treatment. In one the Wassermann, which was 2+ before treatment, became negative at the conclusion of treatment.

In the spinal fluid, the cell count and the quantity of albumin and globulin of the spinal fluid were reduced in varying degrees in all cases. In two cases of tabes dorsalis the spinal fluid Wassermann was reduced from 4+ to 3+. In one case it was reduced from 3+ to 2+. However, in another case it changed from negative to 2+ following treatment. The gold and mastic curves showed considerable change in six cases. Treatment did not appear to influence the serological findings to any marked degree.

CONCLUSIONS

Twenty-three unselected cases of tabes dorsalis and ten of paresis were treated with bismuth, and observed from four months to one year afterward. Improvement in subjective complaints was noted in practically all cases. The treatment was especially effective for pain, numbness, urinary disturbances, and ataxia. The prompt relief of severe pains was gratifying. Some of the patients who had been chairfast became able to walk. The incontinence and retention of urine was either completely relieved or improved in most instances. Impairment of vision did not progress in any case, and in one case it was definitely improved. The findings on neurological examination were usually unchanged, and there was no marked influence on the serology.

One case of paresis showed a remission following treatment which may or may not have been induced by the treatment.

Stomatitis and local induration were the only ill effects, both of which can be avoided with proper precautions.

In our experience bismuth has yielded as good results as any other form of anti-luetic treatment in cases of *tabes dorsalis* and *paresis*.

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THE RELATION OF SALVARSAN TO NEUROSYPHILIS

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In casting about for some feasible reason for the apparent shortening in recent years of the period between the initial lesion of syphilis and the onset of neurosyphilis, we shall attempt to ascertain if the arsphenamine group is not in a measure responsible for this change in the lapse of time since its introduction as a therapeutic agent.

Ehrlich cautioned against the use of salvarsan in well advanced cases of degeneration of the nervous system, but at the same time maintained that the remedy was not harmful to a healthy nervous system.

On account of its recent experience with atoxyl, the medical profession was suspicious of the influence of salvarsan on the optic and other cranial nerves. Nonne reached the conclusion, after making pathological examinations, that salvarsan is not injurious to the optic nerve when it is intact, and also that nonspecific diseases appear to progress no faster after the administration of salvarsan than before its use.

Finger was the first to call attention to the fact that diseases of the facial and acoustic nerves were found more often since the introduction of salvarsan, suggesting that this increase was due to the toxic effect of the drug on the nerves. This was not concurred in by other investigators.

At the annual meeting in 1911 of the German Neurological Society the exponents and critics of salvarsan carried on an extensive discussion of its merits and dangers. At this meeting it was shown that primary and secondary syphilis could not be cured by one dose of salvarsan, as Ehrlich had hoped, though it was still thought that a number of treatments would effect a cure.

Nonne gives the following as the consensus of opinion of this Congress: "More often than formerly since the introduction of salvarsan therapy in syphilis of the nervous system one sees various paralyses of the cranial nerves. A portion of these paralyses is only apparently of more frequent occurrence, because since the beginning of this salvarsan controversy the acoustic nerve and its labyrinthine

branches have been more carefully observed than before. One must admit that salvarsan is able to render spirochaete foci mobile or active which otherwise perhaps might have remained latent. According to Ehrlich's opinion these latent foci are found particularly in those places where salvarsan solution is impeded in its circulation, and as a result of this the remedy is able to attack the spirochaetae only to a limited extent. For example, the various bony canals and foramina through which the cranial nerves course offer suitable conditions for preventing thorough contact of the spirochaete foci with the salvarsan." If these bony structures prevent the free distributions of salvarsan in lues of the nervous system the same would be applicable to early cases of syphilis, as the nervous system is invaded to some extent in all cases of early syphilis as are all other tissues of the organism. Solomon has advanced the idea that certain cases of syphilis are prone to develop the disease of the nervous system later in life no matter what the kind or amount of treatment that they may have had in the early syphilis. Accepting this at full value, it does not account for the shortening of the period from the initial lesion to the onset of nervous manifestations.

We have known mercury to be a specific for syphilis for many years, and its use in conjunction with the iodides was the sole armamentaria of the medical profession prior to introduction of salvarsan as a therapeutic agent. Arsphenamine has modified the treatment as above, and possibly its use by the inexperienced or the placing of too much dependence in it will have to be reckoned with.

We are making a comparison of two groups of cases: Group I having contracted syphilis before the introduction of salvarsan, and Group II having been infected after its introduction:

<i>Group I</i>	<i>Age at time of chancre</i>	<i>Time intervening</i>	<i>Age at onset of neurosyphilis</i>
1.....	19 years	11 years	30 years
2.....	26 years	8 years	24 years
3.....	22 years	15 years	37 years
4.....	22 years	21 years	43 years
5.....	30 years	21 years	51 years
6.....	35 years	22 years	57 years
7.....	21 years	10 years	31 years
8.....	25 years	16 years	41 years
9.....	22 years	19 years	41 years
10.....	22 years	18 years	40 years
11.....	19 years	12 years	31 years
12.....	28 years	9 years	37 years
13.....	32 years	26 years	58 years
14.....	23 years	13 years	36 years
15.....	28 years	8 years	36 years
16.....	24 years	18 years	42 years

<i>Group I</i>	<i>Age at time of chancre</i>	<i>Time intervening</i>	<i>Age at onset of neurosyphilis</i>
17.....	25 years	14 years	39 years
18.....	23 years	23 years	46 years
19.....	27 years	15 years	42 years
20.....	40 years	15 years	55 years
21.....	19 years	14 years	33 years
22.....	25 years	16 years	41 years
23.....	21 years	17 years	38 years
24.....	24 years	19 years	43 years
25.....	25 years	12 years	37 years
26.....	24 years	15 years	39 years
27.....	20 years	14 years	34 years
28.....	19 years	11 years	30 years
29.....	26 years	10 years	36 years
30.....	19 years	11 years	30 years
	24 years	15 years	39 years

<i>Group II</i>	<i>Age at time of chancre</i>	<i>Time intervening</i>	<i>Age at onset of neurosyphilis</i>
1.....	21 years	7 years	28 years
2.....	28 years	10 years	38 years
3.....	29 years	10 years	39 years
4.....	29 years	9 years	38 years
5.....	23 years	11 years	34 years
6.....	26 years	10 years	36 years
7.....	26 years	8 years	34 years
8.....	31 years	2 years	33 years
9.....	24 years	7 years	31 years
10.....	31 years	5 years	36 years
11.....	24 years	6 years	30 years
12.....	21 years	2 years	23 years
13.....	22 years	6 years	28 years
14.....	23 years	10 years	33 years
15.....	26 years	5 years	31 years
16.....	25 years	7 years	32 years
17.....	26 years	9 years	35 years
18.....	40 years	7 years	47 years
19.....	27 years	6 years	33 years
20.....	31 years	8 years	39 years
21.....	33 years	5 years	38 years
22.....	26 years	5 years	31 years
23.....	22 years	3 years	25 years
24.....	21 years	7 years	28 years
25.....	35 years	13 years	48 years
26.....	23 years	5 years	28 years
27.....	24 years	11 years	35 years
28.....	23 years	5 years	28 years
29.....	28 years	4 years	32 years
30.....	29 years	6 years	35 years
	27 years	7 years	34 years

In selecting patients for Group I, 1908-9 were taken as the years to select from, and they were taken in consecutive order. This was a date immediately preceding the introduction of salvarsan as a therapeutic agent.

From the foregoing table we have an average age at time of initial lesion, 24 years; the average time intervening between the chancre and the onset of paresis, 15 years, and the average age when paresis developed was 39 years.

In selecting Group II, 1923 was taken as the year in which the patients were admitted. Taking the admission in consecutive order, it was necessary in this group to eliminate three patients while making the compilation because of their having contracted syphilis before 1911, *i.e.*, before the introduction of salvarsan.

Now from Table II the average age at time of the initial lesion was 27 years; the average age intervening from initial lesion to the onset of paresis was nearly 7 years, and the average age when paresis was diagnosed was 34 years.

By making a comparison of the two groups of cases we find that the average age of initial lesion was as follows:

Group I, 24 years. Group II, 27 years. The average time intervening between the contracting of chancre and the onset of paresis was 15 years in Group I, whereas the average time intervening was only 7 years in Group II. The average age at the onset of paresis was 39 years in Group I, while it was 34 years in Group II. The influence of age seems to be negligible in the foregoing tables, but we shall have to deal with the period intervening between the contracting of syphilis and the diagnosis of neurosyphilis. This period by comparison of above table has slightly more than double the number of years in Group I than in Group II. Now three cases were eliminated in selecting the latter group, which is exactly 10 per cent of each group, so we may deduct 10 per cent from 15 or add 10 per cent to 7, which would seem to be a fair allowance, and the result would still remain in a ratio of approximately two to one. The stress and strain incident to war and post war conditions may be classed as contributing factors, but let us look still deeper below the surface and see if there may not be other reasons.

In the early days following Ehrlich's discovery of salvarsan it was generally conceded that salvarsan *per se* did not produce any harmful effect on healthy nervous tissue. But we might expect involvement of the nerves due to limited circulation through the bony structures, in which the drug when put *en masse* into the circulation, as is the case in salvarsan therapy. This also would apply to the parenchyma of the brain and cord, as here, too, the blood supply does not flow as freely as it does in other parts of the human anatomy.

To the writer it would appear that by so-called intensive treatment, in the early stages of syphilis, killing off the spirochaete

en masse, preventing or eliminating the apparent necessity of the system to create antibodies or the building up of a natural immunity, and by putting too much dependence on arsphenamine therapy, might in a great measure be responsible for this fewer number of years from the time of the initial lesion to the onset of pathology of the nervous tissues.

For example, we take a given case of syphilis which falls into the hands of the physician who has had only a limited experience with this disease; the patient is given a few treatments of salvarsan, followed by a number of mercurial treatments or possibly none. Said patient's serology comes back negative, and he is pronounced as recovered. The concept that syphilis is a grave general disease is lost sight of, and instead of treating it as such it is often treated only until all local manifestations have disappeared. Here we would have a case favorable for the later development of paresis or other nervous involvement, because he has built up no natural immunity, he has had insufficient treatment, and the few spirochaete left in the tissues will develop and multiply more rapidly, thereby causing more rapid destruction of the tissue involved, and if in the brain would cause the patient to become a parietic at an earlier date than otherwise. The following case will serve to illustrate:

Patient was admitted to this hospital September 1, 1920. His previous history shows that he was born June 11, 1892, second in order of birth, had the usual diseases of childhood; school life began at age of six and ended at age of fourteen, making normal progress in school. After leaving school he worked at various jobs until January 10, 1910, when he enlisted in the U. S. Army. Here he had continuous service until August, 1920. He contracted syphilis in 1914 and was given six treatments of salvarsan intravenously by a physician outside of the service.

His previous history shows that when placed on the sick list he showed the mental and physical picture of general paresis, and when admitted to this hospital he was euphoric, expressed expansive ideas, and had lack of insight and judgment. Neurologically he showed unequal and irregular pupils, positive Romberg sign, and muscular tremors. His serology shortly after admission was as follows:

Blood, Wassermann reaction, + + +
 Spinal fluid, Wassermann reaction, + + + +
 Protein content, increased
 Cell count per cm., 11
 Colloidal gold curve, 5555432100

This case was diagnosed general paresis, and his subsequent serological examination has continued to indicate that this diagnosis is correct. Many other cases similar to this case might be found by going into the case records. Let it suffice that it is very essential for the future welfare of the patient that arsphenamine be given in only moderated dosage while mercury is applied strenuously even from the time syphilis is diagnosed until the treatments are finished.

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CURRENT LITERATURE

I. VEGETATIVE NEUROLOGY: THE NEUROLOGY OF METABOLISM.

1. VEGETATIVE NERVOUS SYSTEM.

Stocker, A. HEMOCLASIA AND PARALYSIS OF THE SYMPATHETIC. [Zschr. f. d. ges. Neur. u. Psych., Vol. LXXIX.]

Stocker believes that hemoclasia rests upon toxic paralysis of the sympathetic due to the products of protein disintegration. Adrenalin increases the capacity for resistance.

Kreis, J. SYMPATHETIC AND PARASYMPATHETIC TONUS IN GYNECOLOGY. [Gynecol. et Obstetrique, Vol. V, 1922, No. 6.]

On having briefly reviewed the experimental results of the physiology of the autonomic nervous system inasmuch as they may be adapted to clinical study, the author develops a method for examining the *tonic* system of the sympathetic and parasympathetic practice, taking as example a normal case and several cases with endocrinic troubles in which alterations of the menstruation are prevalent as the cardinal symptoms. He has simultaneously studied the pulse, the oculo-cardiac reflex, the arterial tension, the dermographical reaction, the pilomotor reflex, the urinary discharge with regard to the water and chlorine; in the first place, without having previously injected a pharmacological agent, then during three hours after an injection of 0.01 pilocarpine and 0.0005 of adrenaline and 0.0005 of atropine. Meanwhile all the clinical reactions have been observed, particularly the blood formulæ, suggested by the method of Eppinger and Hess and of their adepts (a method of investigation, too superficial and frequently contested, which, according to the author's opinion, has been unable to discover the mechanism in action and which has vulgarized superficial opinions on the hyper and hypotony of the autonomous system).

By means of a comparative investigation of the functional nervous reaction after elective pharmacological stimulus or paralysis on various organic systems, which are very accessible in their reflex reactions, the author thinks firstly of being able to establish the functional connections between the sympathetic and the parasympathetic in a pathological case, then also of being able to distinguish the nature of the lesion and of ascertaining whether it could be imputable to either one of the antagonists.

He finds his diagnosis on the whole of the effects associated with

the various tests, insisting particularly on the phenomena of counter reaction, *i.e.*, a contrary reaction to the one which should occur according to the experiments made on the animal and which is moreover confirmed by the counter tests.

The research method is developed by means of a few observations with pathological menstruations of different origin so as to indicate on the one hand that the participation of the autonomous nervous system is constant; on the other, that the variability of functional nervous troubles is far greater than generally admitted by the authors who have been interested in the question; the extent of the lesion is very varied and it is inadmissible to conclude the nature of the menstrual trouble by the character of nervous troubles. Each species of amenorrhoea, for instance, has its peculiar nervous syndrome which has to be discovered. It may as well bear on the sympathetic as on the parasympathetic despite the same clinical symptoms.

Lastly, the author points out a case of congenital amenorrhoea, which has been examined according to his method before opotherapeutic treatment and seven months after complete clinical success, the tonic changes of the autonomous nervous system which have occurred through the appearance of a regular menstruation. [Author's abstract.]

Brüning. TROPHIC FUNCTION OF THE SYMPATHETIC. [Klin. Woch., January 8, 1923, II, No. 2.]

Brüning contends that trophic ulcers are due to augmented tonus of the sympathetic nervous system. They develop only some time after the injury, not until a neuroma has formed or pressure from the cicatrix begins to act. Periarterial sympathectomy lowers the tonus also proximal to the field of operation. In a case of injury of the cauda equina, not only the ulcer on the right heel, but also a large bedsore on the right buttock healed after periarterial sympathectomy on the femoral artery. Excessive sympathicotonia leads to degeneration and even necrosis. Reduction of the sympathicotonia is followed by regeneration and even hypertrophy. The way to produce artificially a gastric ulcer would be to augment the sympathicotonia.

Spadolini, J. DEFICIENCY DISEASES AND EXPERIMENTAL LESIONS OF THE SUPERIOR MESENTERIC PLEXUS. [Arch. di fisiol., 1922, XX, 165.]

After the removal of extensive portions of the superior mesenteric plexus, cats may survive from two or three days up to a month. After the operation they exhibit the following symptomatology: progressive diminution of the body temperature, dyspnea, anorexia, sickness, diarrhea, frequently associated with presence of blood in the excrement, albuminuria, and a general and rapid decay ending in death. In addition, paresis and a spastic condition of the hind limbs may be observed, these phenomena being accompanied by loss of hair and other cutaneous dystrophic changes. Most important are the lesions of the digestive

organs and nervous system. In the small intestine an intense congestion and a diffuse necrosis of the mucous membrane are often observed; the pancreas is atrophic and the liver congested; the mesenteric lymph glands are edematous and congested if the animals survive a few days, but sclerotic or atrophic in those surviving for longer periods. The lesions of the spleen are similar to those of the mesenteric lymph glands. In addition, parenchymal alterations of the kidneys are not rare, and interstitial hemorrhages in the lungs, heart, and muscles frequently occur. The adrenals are swollen, while the thyroid is noticeably atrophic. Chromatolysis and other acute changes are found in the coeliac and other sympathetic ganglia, as well as in the anterior and lateral cell groups of the spinal cord. According to the author these various symptoms and changes are analogous to those due to the absence of the B accessory food factor. He therefore puts forward the suggestion that certain forms of avitaminosis may be connected with a primary lesion of the autonomic nervous system. [daFano, Med. Sc.]

Houssay, B. A. EFFECTS OF IRRITATION OF SPLANCHNIC NERVES. [Prensa Méd. Arg., November 20, 1922, IX, No. 17.]

In cats and dogs the author here shows that irritation of the splanchnic nerves increases the secretion of adrenalin. The rise in blood pressure is due to the increase of this increased adrenalin output but also to vasoconstriction resulting from the direct stimulus of the splanchnic system.

Jungmann, P. SALT METABOLISM MECHANISMS. [Klin. Woch., January 1, 1923, II, No. 1.]

In this report upon an abscess of the pituitary with diabetes insipidus which later disappeared the author suggests that they were due to increased pressure on the mesencephalic structures. The full complex of diabetes insipidus, he says, consists in disturbance of the vegetative centers that regulate water and salt metabolism, and the composition of the blood, although he does not go any further in the more precise analysis of the fiber pathways or their synaptic connections.

Oehme, C. WATER METABOLISM. [Klin. Woch., January 1, 1923, II, No. 1.]

Following the recent studies of Driesl, Lewy, and others on the neurology of metabolism, this author gives a short review particularly of the disturbances of water metabolism, discussing especially its central regulation. The influence of hormones on the central nervous system is but imperfectly known, but pituitary extract influences diuresis even after destruction of the nerves of the kidneys (not ever entirely destroyed?). No definite proofs were given that the condition of the blood colloids changes in diuresis due to caffeine. Comparison of the refraction and viscosity of serum, which should show the alleged changes in dis-

persion of colloids, had negative results. It is more probable that the changes occur in the colloids of the organs themselves—kidneys as well as tissues. The tendency of the organism is to develop ontogenetically and phylogenetically toward constancy of blood composition and changes of concentration in the cells. These cause the movement of substances into them and from them. This regulation is perfected by especially sensitive cells of the central nervous system. It is probable that, in cases of diabetes insipidus in which changes were observed only in the pituitary gland, the authors omitted to examine the tuber and the paraventricular nuclei of the brain.

Tallqvist, T. W. THE AUTONOMIC NERVOUS SYSTEM. [Fins: Läk. Hand., November-December, 1922, LXIV, Nos. 11-12.]

This is a scholarly review of the pathologic physiology of the vegetative nervous system.

Tournay, A. THE SYMPATHETIC AND SENSIBILITY. [Médecine, February, 1923; J. A. M. A.]

Tournay reviews the old question whether the changes of sensibility after lesions of the sympathetic are of vascular origin, or are specific. In clinical cases there are attacks of pains which come in slow waves and are accompanied by changes in blood supply, secretion, and local temperature. They occur almost exclusively after lesions of the median and sciatic nerve, which contain many sympathetic fibers and a special artery.

Van Rijnberk, G. ORGANS WITHOUT LOCAL NERVOUS APPARATUS. [Ned. Tijd. v. Gen., December 23, 1922, II, No. 26.]

In this short paper this Dutch physiologist argues that organs which do not possess a local nervous apparatus all have one thing in common, their function is subordinate to a higher and more general function. The striped muscles, the glands with a known internal secretion, the sweat glands, the liver, the testicles, the kidneys, and ovaries are all under strict nervous and chemical control to insure the best results for the organism as a whole. When cut away (in part) from the central systems their local autonomy arrests itself. [In reality so long as the blood vessels still go to an organ it remains, through the blood wall neural nerve net in connection with the vegetative plexuses. Much of modern experimental physiology which speaks of cutting an organ away from its nerve connections is unsound, since such severance is almost never carried out.]

Davis, L. E. THE PATHWAY FOR VISCERAL AFFERENT IMPULSES WITHIN THE SPINAL CORD. [Am. J. Physiol., 1922, LIX, 381; Med. Science.]

Stimulation of the thoracic sympathetic in cats raises the blood pressure. A similar effect is produced by stimulation of somatic nerves—for instance, the sciatic nerve, provided that the stimulus is sufficiently strong. But these two impulses are conducted along different paths within the

spinal cord. The pressor pathway from the somatic nerves has been shown by Ranson and his coworkers to be situated in the apices of the posterior horns. This last named pressor reflex is abolished by bilateral destruction of the apex of the posterior horn and of Lissauer's tract. But such a lesion does not abolish the pressor response from stimulation of the sympathetic. In fact no lesion short of complete transverse section of the cord has been found to abolish this sympathetic response. It is concluded, therefore, that the visceral afferent pathway producing vasomotor and respiratory reflex consists of relays of short fibers with synapses in the gray matter of the cord. The reflex arc is not complete within the cord, the impulses must reach the vasomotor synapses in the medulla.

Bok, S. T. THE CENTRAL RELATIONS OF THE NERVUS SYMPATHICUS. [Nederlandsch Tijdschr. voor Geneeskunde, LXVI, August 5, 1922, p. 642, 1 fig.]

Bok reports to the Amsterdam Neurologists' Society the results of his study, by Cajal's method, of the reflex apparatus of the thoracic spinal cord of guinea-pig embryos, undertaken by him to attempt to determine the central course of the pre-ganglionic neurites and also from which system these pre-ganglionic neurones receive their stimuli. In the ventro-lateral column of the guinea-pig embryo's thoracic spinal cord there is a peculiar net-like structure; there is in this column a functional subdivision, so that the most medial part conducts heterolateral sensory stimuli and the most dorso-lateral part homolateral sensory stimuli from its own segment, while the intermediate ventro-lateral region conducts stimuli from both sides from many segments. The tertiary neurones, which all arise in cells of the floor-plate, are arranged in a 13 mm. embryo, in four groups. Ventro-laterally is the group of the future large ventral horn cells whose neurites pass out in the line of the ventral root. Ventro-medially there is, in the ependyma, a group of large motor cells—described by Cajal—viz., the group out of which by ventro-lateral migration the motor ventral horn nucleus is formed; this migration of somatic motor neurones thus occurs near the place where bilateral stimuli are brought together from many segments. In the dorsal part of the floor-plate, bordering on the roof-plate, we find two groups of tertiary neurones of the pars intermedia. The nucleus intermedio-lateralis (lateral horn) lies against the most dorso-lateral part of the lateral column, and thus receives homolateral sensory stimuli from its own segment. The neurites run ventralwards (tractus latero-ventralis) to take exit in the ventral root of its segment. The nucleus intermedio-lateralis is thus a root-nucleus; and, on account of the lack of thick medullary sheaths in the area of the tractus latero-ventralis, and for various other reasons also, it is most probably the nucleus of origin of the pre-ganglionic sympathetic fibers. The nucleus intermedio-medialis lies against the ependyma, and has attenuated cells with long dendrites which receive homolateral, homo-

segmental stimuli from the arcuate fibers of His and send their neurites lateralwards (tractus medio-lateralis) through the nucleus intermedio-lateralis—to which nucleus fibers are given off—to a medial part of the lateral horn (the tractus intermedio-longitudinalis) in which path these fibers ascend and descend, sometimes after dichotomy. Thus, stimuli from the nucleus intermedio-medialis reach the nucleus intermedio-lateralis in many segments, and take their exit polysegmentally by synapse in this nucleus. The same relations exist in later embryonic stages, but are less plain owing to the multiplicity of elements. From the nucleus proprius medialis cornu posterioris a direct path is developed to the nucleus intermedio-lateralis and the lateral column (the tractus dorsolateralis) that must likewise have an autonomic function. Possibly the viscerosensory fibers end between this dorsal horn nucleus and the nucleus intermedio-medialis. The space between the nucleus intermedio-lateralis and the ventral horn nucleus is in younger embryos smaller, so that in 9 mm. embryos the cells of the future lateral horn are connected, without any limit, with those of the future ventral horn. A single motor cell-column splits into a somatic motor ventral horn nucleus and a pre-ganglionic autonomic lateral horn nucleus (analogous to the splitting of one cell-column into the somatic and the visceral motor nuclear columns of the medulla oblongata). Embryology thus shows us the analogy of the pre-ganglionic neurone to the motor ventral horn neurone of the voluntary nervous system. It always receives its stimuli from secondary "linking" cells, and takes its origin from the same cell-group as the ventral horn neurone. The complete reflex arc of the involuntary nervous system is composed of at least four cells: (1) a sensory, (2) a central "linking" cell, (3) a pre-ganglionic, and (4) a ganglionic neurone or a chromaffin cell. Bok thinks that this conclusion points to the correctness of Camus' researches according to which the nerve cells of the sympathetic and the parasympathetic ganglia develop *in situ* from mesenchymatous cells, and thus not by migration from the central nervous system as taught by Onodi and, more recently, especially by Kuntz. [Leonard J. Kidd, London, England.]

Tello, S. J. PRESENT CONCEPTIONS OF NEUROTROPISM. [Siglo Med., January 27, 1923.]

This is a review of international literature on this subject, with report of original work, the whole forming Tello's maiden address on entering the National Academy of Medicine, with a reply by Cajal.

Ellsworth, Adelaide. BICHLORIDE OF MERCURY POISONING. [Penn. Med. J., 1922.]

Author reports the case of a woman who swallowed a solution of mercuric chloride containing four grams of the salt. Vomiting occurred almost immediately and the vomitus was free from bile and blood. Patient went into a state of collapse. Stomach was washed with warm

water and three-tenths gram of calcium sulphide boiled in 150 c.c. of distilled water was injected intravenously and the usual remedies for shock applied. The calcium sulphide was repeated on the two following days and similar doses were given by mouth. Sodium bicarbonate was given in five grain doses intravenously on the second, third, and fourth days. The blood and urine twenty-four hours after poison was swallowed showed the following: Blood: uric acid, 5; urea N., 90; creatinin, 1.4; glucose, 120 mgs. per 100 c.c.; red cells, 5,000,000; white cells, 10,600; polynuclears, 90 per cent. Urine: 900 c.c.; sp. gr., 1.010; acid; deep yellow color; heavy ring of albumin; no glucose and numerous hyaline, granular, and epithelial casts. Daily analyses of blood and urine were made. The blood returned to normal on the fourth day and the urine on the 10th day. Patient made an uneventful recovery. [Author's abstract.]

Lahy, J. M. THE GALVANOPSYCHIC REFLEX. [Médécine, June, 1922, Vol. III, No. 9, p. 696; J. A. M. A.]

Lahy discusses the differences in the galvanometer readings when connected with a human body and generator. The resistance of the body to the electric current varies even with mere emotions, and this galvanopsychic reflex is thus one of the most sensitive means at our disposal for investigating emotion. It is significant that the response is most pronounced when the electrodes are placed on a region where sweat glands most abound.

Mayer, K. CALCIUM AS EXPERIMENTAL ANTIDOTE FOR COCAIN. [Schweiz. med. Woch., August 24, 1922, LII, No. 34; J. A. M. A.]

Mayer reports the results of extensive research in a quest for an antidote for cocain. He found that the toxic action of cocain could be attenuated in animals by administration of calcium salts. The action of cocain seems to be checked by calcium and enhanced by potassium, hence he concludes that the action of cocain is dependent on the balance between the ions of calcium and potassium. Cocain and calcium seem to have a reciprocal inhibiting action in respect to lipoids, especially suspensions of lecithin. He declares that his research has established that the action of cocain depends on physical-chemical colloid processes, not on chemical processes. The potassium ion is an antagonist of calcium, and the theoretical assumption that an excess of potassium would enhance the toxicity of cocain was proved to be the actual fact in experiments on the frog heart.

Henderson. ON THE SENSITIVITY OF DIFFERENT NERVE ENDINGS TO ATROPIN. [Jl. Phar. & Exper. Therap., 1923, XXI, 99.]

Textbooks on pharmacology frequently state that atropin depresses or paralyzes the nerve endings of the parasympathetic nervous system and the clinician is led to believe that this action is induced by ordinary therapeutic doses. According to Henderson, this is not the case; indeed,

the usual therapeutic dose of atropin slows the heart by stimulation of the vagus center and the vagus endings are not paralyzed. He accordingly determined the amounts of atropin necessary to depress the ends of the bulbosacral autonomic outflow and ascertained the amounts necessary to cause so complete a paralysis of the various nerve endings that nerve stimulation with an induced interrupted current became ineffective. The nerve endings are depressed in the following order: Nasal, chorda secretory, cardiac vagus, tonus of pyloric sphincter and small intestine, bladder, oculomotor to the pupil, salivary vasodilator, vagus to intestine for rhythmic and peristaltic movements. The endings are paralyzed in the order: Cardiac vagus, chorda secretory, chorda vasodilator, intestinal vagus. The endings in the bladder cannot be completely paralyzed. In man it was found that 0.2 mgm. caused a decrease in nasal secretion but not marked drying of the mouth, while 0.3 mgm. dried the mouth. This amount relieved griping produced by aloes. Two milligrams are required to increase the heart-rate to 150; this dose caused a submaximal dilatation of the pupil.

Oswald, A. NERVOUS SYSTEM IN DISEASE OF ORGANS. [Schweiz. med. Woch., LII, 1922, p. 553.]

Oswald presents arguments to sustain the belief that the nervous system affects the vital reactions more than is taught by orthodox internists. The familiar experience that "the mouth waters" at sight and smell of appetizing food suggests that something of the same stimulating nature may occur in one or more of the endocrine glands under certain experiences. They may "water" in response, or their normal "watering" may be stopped by emotional influences. A catarrhal gastric or intestinal affection of psychogenic origin, a conjunctivitis from mental overwork, a catarrhal endometritis may resist all treatment until the nervous system is rested and soothed, and then the cure is prompt and complete. When the autonomic nervous system is sensitized from any reason, it responds more readily to slight stimuli. Gastric and duodenal ulcer, colitis, chilblains, and Raynaud's disease have already demonstrated the frequent preponderant share of the nervous system in their development. He is inclined to ascribe to the present mode of life an overstimulation of the nervous system. This entails an excessive functioning of the endocrine glands; they produce an excessive amount of hormones, and this brings excessive growth. He offers this as the explanation for the unusually large number of exceptionally tall young persons that are developing now, shooting up far beyond the average. This does not indicate an improvement but rather deterioration of the race.

Seifert. TROPHIC ABSCESSSES AND SYMPATHECTOMY. [Verhandlung der Bay. Chir., 1922.]

Seifert discusses Leriche's proposed treatment of trophic tissue changes by means of peri-arterial sympathectomy. The manner in which it

becomes effective depends, he states, upon the anatomical arrangement of the vascular innervation in the extremities. The method is at least worthy of consideration as of possibly special value in the treatment of primary trophic neuroses. Leriche has given two cases which show clearly that symptoms can be removed, for in these two cases the sympathocotomy which took place in resection of the A. femoralis, A. poplitea in one case, brought about marked trophic changes without injury to the spinal nerves. This has nothing to do with the anemic necrosis which follows suture or ligation of the vessels but opens up its own possibilities for surgery of the blood vessels.

Seifert, E. THE PERIPHERAL SYMPATHECTOMY QUESTION. [Arch. f. klin. Chir., November 30, 1922, CXXII, No. 1; J. A. M. A.]

Seifert applied Leriche's method of peripheral sympathectomy without much benefit in a case of traumatic injury of the hands with suspicion of syringomyelia. The improvement afterward was slight although the changes induced at first were striking. In a case of trophoneurosis in a man, aged thirty-five, the immediate and persisting benefit was pronounced, both subjectively and objectively. Reports as to the durability of the improvement are contradictory. Possibly a difference in the technic may be responsible for this diversity in the outcome. He describes two cases in which trophic disturbances followed the severing of the femoral or popliteal artery and immediate suture of the stumps. The periarterial sympathetic fibers had evidently been injured and trophic disturbances followed. The conditions were thus exactly the reverse of the intentional peri-arterial sympathectomy to cure trophic disturbances. He declares that besides the mustard test, the blood pressure, and test hyperemia below a constricting band, we must examine the capillary circulation with the microscope and also the histologic findings, as further functional tests. The cases of gangrene after ligation of arteries should be revised from this standpoint of injury of peri-arterial sympathetic fibers. His final conclusion is the need for caution in operating on arteries.

Orr, David, and Sturrock, A. Corsar. TOXI-INFECTIOUS LESIONS IN THE CENTRAL NERVOUS SYSTEM. [Lancet, August 5, 1922.]

David Orr and A. Corsar Sturrock, from a series of experimental investigations into the influence of disturbances of the sympathetic mechanism on the localization of these lesions, draw the following conclusions: 1. Sympathetic division alone produces vascular dilatation, perivascular edema, slight proliferation of adventitious cells, which may be a response to increased permeability of the vessel wall from sympathetic paresis and the release of certain noxious products from the circulation; also morbid nerve cell changes. The areas affected were those supplied by the pial vessels: the cornu ammonis and fascia dentata, the caudate and amygdaloid nuclei, the pyriform lobe and the cortex cerebri. 2. Division of the cervical sympathetic is followed by a general intoxication

and the lesions are found in the same areas but in a much greater degree and the unilateral division of the sympathetic intensifies the toxic morbid lesion on the same side. The areas involved in both experiments were the archaic regions of the brain and the cerebral cortex. These are all supplied by the pial vessels (under sympathetic control). It would appear, therefore, that the sympathetic nervous system is an important factor in toxi-infective inflammation and degeneration and its involvement is a contributory factor in the localization of lesions, not only in the central nervous system, but probably wherever they may occur. 3. The periarteritis in the head of the caudate nucleus is so well defined and so localized as to seem of special significance; this area is in direct communication with the basal cortex and therefore with pial supply. 4. The lipid secretion in the ventricles and choroid plexus is an active process, as shown by the intense and early secretion of the lining epithelium; it is a protective as well as a regenerative mechanism. 5. The lesions described above show definite changes in the archaic areas and cortex and are produced through interference with the blood supply without toxic influence, although the additional intoxication intensifies the reaction. A healthy circulation is essential for the maintenance of balance of the various reciprocating portions of the nervous system and a healthy psyche depends upon it to a great extent.

Greving, R. PATHOGENESIS OF FEVER WITH SPECIAL REGARD TO THE NEUROLOGICAL AND PHYSIOLOGICAL FOUNDATION OF TEMPERATURE REGULATION. [Deut. med. Wochschr., December 15, 1922, No. 50, p. 1673 (conclusion in No. 51)].

Experiments in the last ten years have brought forth abundance of facts bearing on the pathogenesis of fever, not, however, without giving rise to new problems. In regard to the neurological foundation, Isenschmid and Krehl, employing the elimination method on the assumption that the exclusion of the thermogenic center would lead to a total suspension of temperature regulation, localized the center in the midbrain. Further experiments indicated the tuber cinereum as the more precise localization, so that this latter acquired the high importance of a center for the regulation of the entire metabolic processes of the organism, as the chemical temperature regulation consists in promoting or inhibiting these metabolic processes. We have long known that the carbohydrate, the fat, and the albumin metabolism are under the regulatory influence of the midbrain. We know further, from recent experiments, that the water and salt metabolism also receive regulatory impulses therefrom. The fundamental life functions of the organism have therefore a center in the midbrain, which is in consonance with the great phylogenetic age of this brain region.

The midbrain forms a part of the wall of the third ventricle. If we are obliged to assume a vegetative center in the midbrain this is in harmony with the general laws for the construction of the central nervous

system, the law being that the vegetative functions have their central representation in the cell groups which are arranged about the central canal, that is, the third and fourth ventricles, while the motor centers are located ventrad, the sensory, caudad. However, these relations are somewhat obscured in the midbrain. For the sensory centers the localization is in the thalamus. For the vegetative, around the third ventricle (nucleus paraventricularis, tuber cinereum, corpus mamillare, corpus Luysii, etc.). The centers serving the motor functions, however, are displaced more in a lateral direction (globus pallidus, nucleus of the ansa peduncularis, etc.). The variety and significance of the functions of this brain region are in keeping with its complicated cyto-architectonic structure, where, as one is able to show, numerous nuclei of distinctly different morphological character are crowded into a small space. Between these nuclei clearly defined fiber systems take their way. They connect the nuclei of the hypothalamus with the subcortical basal ganglia, the pallidum, and thalamus opticus on the one hand, and on the other with the subordinate vegetative centers in the medulla oblongata and in the spinal column. The connection of the fibers of the nucleus of the tuber cinereum with the subcortical basal ganglia is probably the anatomical foundation which renders possible the production of fever through puncture. The significance of the conduction of the nervous impulses from the basal ganglia to the temperature center is, however, still obscure. It is also not possible at the present time to determine more closely the localization of the temperature center in any one of the various cell groups in the hypothalamus. There is also phylogenetic evidence that the nuclei tuberis are the centers for temperature regulation, as these latter make their appearance simultaneously with this function, at the same developmental stage. The vessels and sweat glands also participate in the mechanism of temperature regulation. According to Karplus and Kreidl, we must assume the central representatives of vasomotility and sweat secretion to be the corpus subthalamicum (corpus Luysii). We are obliged to assume that there is a close connection between the centers for temperature regulation and that for vasomotility and sweat secretion, but as yet no proof has been given of such connection. Nucleus groups which may be connected with the vegetative function are the following: substantia grisea centralis, nucleus paraventricularis, nuclei supraoptici, nucleus mamilloinfundibularis, nucleus intercalatus, substantia reticularis hypothalami, nucleus paramedianus, as well as cell groups in the corpus mamillare, and possibly the nucleus pallido infundibularis and the nucleus interfornicatus in tuber cinereum. Greiving designates some of the nuclei, because of their histological picture as vegetative nuclei, *i.e.*, the substantia grisea centralis, the nucleus supraopticus, paraventricularis, and paramedianus. The author does not maintain, however, that the others are not also vegetative in nature; a more definite localization of every separate vegetative function in a definite nucleus is at the present time impossible.

According to the experiments of Isenschmid and Schnitzler, the conduction paths going out from the temperature center in the tuber cinereum take their course probably through the basal two-thirds of the median part of the midbrain, being distributed over a relatively broad area, so that a lesion in a part of these fibers does not hinder temperature regulation. Here the anatomic course of the paths is wholly unknown. The paths then run to the medulla oblongata, where there is a partial conduction of the impulse to the dorsal vagus nucleus. In this region, according to the experiments of Brugsch, Dresel, and Lewy, there is a sympathetic and a parasympathetic nucleus which regulate the composition and decomposition of glycogen and in this manner the temperature regulatory apparatus makes use of the glycogen metabolism, and is able to influence the metabolism of the other inner organs innervated by the vagus. Other fibers take their course through the cervical spinal cord, whence they are conducted to the inner organs in part over the rami communicantes of the last cervical and first dorsal nerves and over the funiculus marginalis and the nervi splanchnici. In part they run downward in the spinal cord to the spinal vegetative centers for vasomotility and sweat secretion.

If we now ask what the regions for the production of warmth are the foregoing shows that the inner organs represent these regions, especially the large glands (liver, pancreas, etc.). This is in contradiction to the assumption prevalent a few years ago that the chemical production of heat took place in the muscles. It is to be assumed that when the muscles are contracted for motion heat is developed as a by-product, but for the chemical regulation of heat this is negligible. The increase of the processes of metabolism for the purpose of producing heat is not brought about, therefore, solely and directly through the influence of heat centers over the nervous paths, but in part through the inner secretory glands. In this connection are important the hormones of the thyroid, the suprarenals, and the hypophysis. The experiments of Mansfield and Adler seemed to show that the thyroids were the most important inner secretory factor in this process, but those of Hildebrandt, Grafe, and v. Redits, and others, indicated that the thyroids were not the dominating factor. It would seem that several paths are open by which equilibrium of temperature may be preserved. If one is suppressed, as by the extirpation of the thyroids, other ways, for example, the direct nervous control of metabolism, or through other inner secretory glands (the suprarenals) are made use of. The significance of the thyroids cannot be closely defined until further experiments have been undertaken. We find the same lack of clearness in our knowledge concerning the rôle of the other inner secretory organs for temperature regulation. It is certain, however, that the suprarenals are necessary both for the preservation of life and for preservation of temperature equilibrium. In animals in which both suprarenals have been extirpated, fever can no longer be produced by puncture. They die with extreme fall of temperature. Injection of

adrenalin which, as is well known, produces fever, raises the fallen temperature in animals without suprarenals. In rabbits that have been rendered poikilothermic by cutting off the midbrain, fever could not be produced by injection of adrenalin.

In animals in which the midbrain path is cut off at the height of the adrenalin fever the temperature sinks immediately (A. Meyer). The adrenalin fever can also be suppressed by morphine when it has a central effect. From these observations it is to be inferred that the hormone of the suprarenals (contrary to the secretions of the thyroids) acts on the temperature center itself in the form of a stimulus.

For the normal excitement of these temperature centers an extremely small amount of these hormones is sufficient, for we know that a mere touch of adrenalin solution on the tuber cinereum produces immediate death. Besides this predominantly central effect, the adrenalin also certainly exercises a peripheral influence, principally on the sympathetic terminal nerve apparatus. The significance of adrenalin for the regulation of temperature, then, seems to consist in a sensitization both of the temperature centers and of the sympathetic terminal nerve apparatus. The secretion of the anterior lobe of the hypophysis shows a similarly centrally exercised effect. Nothing is known concerning the peripheral effect of hypophysis preparation.

All these facts show what an important rôle the inner secretory glands play in the temperature regulating mechanism. If we take into consideration the separate processes involved, the number of organs of the body participating in the mechanism, and that both inciting and inhibitory impulses must be sent to the various regions, and that in spite of constantly changing conditions of heat and cold the temperature of the body varies only by a few degrees, the necessity for a temperature regulating center is obvious. The conditions for the proper functioning of the center is the possibility of instantaneous communication of every variation of temperature at the periphery or in the body. This takes place through the centripetal nervous paths but principally through the blood. The nervous impulses are conducted centripetally through the temperature nerves of the skin to the spinal cord, thence through the tractus spino-thalamicus to the thalamus. From the thalamus some of the fibers go to the brain, where consciousness of heat and cold takes place; others to the temperature center of the tuber cinereum, thus acting reflexly on the mechanism for regulating temperature. But the stimuli arising from the temperature of the blood are more important than those coming directly from the nerves, and the temperature of the blood may be regarded as the normal physiological stimulus for temperature centers.

From the pharmacological side it is indicated that we cannot assume the temperature center to be a single whole; that there must be two centers—one for heat and one for cold—of which the first is of sympathetic and the other of parasympathetic nature. We have as yet no anatomical proof of this assumption, for we do not know the exact local-

ization of one temperature center, to say nothing of two. Furthermore, by puncture we have been able thus far to produce only rise of temperature, never lowering. But, on the other hand, sympatheticus poison increases heat, while poisons influencing the parasympathetic cause fall of temperature. These facts render it not improbable that the temperature center includes a sympathetic factor for raising the temperature and a parasympathetic one for lowering it.

The causes which give rise to fever may be divided into five groups: 1. Outer influences which affect the organism as a whole, baths, too heavy clothing, etc. 2. Mechanical and chemical stimuli which act directly on the midbrain. 3. Chemico-physical stimuli, as intravenous injections of certain substances. 4. Toxic stimuli, the form most usually observed in disease. 5. Diseases of the inner secretory glands, the hormones of which are indispensable for the normal functioning of the temperature centers. Fever in the majority of cases is caused by a functional disturbance of the temperature centers in the midbrain, probably in the form of a stimulus to the center. This leads to the production of bodily heat, which, if there is not sufficient radiation, causes a rise of temperature. It must be remembered in this connection that there is also, at the height of the fever, a certain temperature regulation which tends to preserve the degree once attained in spite of external variations of temperature.

Though fever is a pathological symptom, yet we do not, as formerly, seek to combat it. For we know that we can in no wise favorably influence the fundamental pathological processes in this way. On the contrary, we are justified in assuming that the fever represents measures for setting the defense mechanism of the organism into activity against the disease. Indeed, modern therapy even goes so far as to produce fever artificially for the purpose of combating certain diseases. [Jelliffe.]

Fatou, E. PEPTONE THERAPY IN ANAPHYLACTIC SYNDROMES. [Bull. Méd., September 30, 1922, XXXVI, No. 40; J. A. M. A.]

Vallery-Radot and Fatou have observed the success of peptone in the treatment of somnolency, flatulence, heaviness, diarrhea, and arrhythmia occurring after meals. Postprandial erythema of the face is another one of the disturbances among those caused by incompletely digested proteins, which the strictest diet and various medications may be unable to stop. Vallery-Radot and Fatou witnessed a drop of the leukocytes from 9,500 to 5,500 in one of their patients after an albumin meal followed by erythema of the face. Humoral disturbances and clinical signs developed together. An identical meal preceded by peptone was not followed by a decrease of leukocytes or erythema. This and other observations demonstrate that facial erythema accompanied by a decrease of leukocytes is due to the passage into the circulation of albumins not entirely disintegrated, and that the humoral and skin disturbances can be warded off by preventive peptone therapy.

II. SENSORI-MOTOR NEUROLOGY.

8. NEUROSYPHILIS.

Koch, L. M. CHEMICAL EXAMINATION OF THE CENTRAL NERVOUS SYSTEM IN PARESIS. *Am. Arch. Neurol. & Psych.*, VII, 488. *Med. Sc.*]

Chemical analysis of five parts of the central nervous system in two cases of uncomplicated paresis showed the following changes as compared with normal controls. There was a tendency for the water and proteins to increase and for the lipoids to decrease, and a considerable increase in the water-soluble substances, and since the total solids were practically unchanged, these probably compensated for the loss of the lipoids and especially of phosphatids. Of the lipoids, cholesterol showed a relative increase in all parts, except in the cerebrum where it was practically normal. The phosphatids showed a consistent decrease, while the cerebrosids and sulphatids were less changed. This appeared due to the fact that in the brains investigated the white matter was less affected than the grey. The lipid phosphorus and lipid nitrogen were decreased, while the extractive phosphorus and extractive nitrogen were increased. These results agree with those previously obtained by other authors. From a comparative point of view, the author points out that general paralysis differs from dementia precox because in the former the destructive changes affect several constituents, while in the latter, W. Koch found a diminution in the non-protein neutral sulphur fraction in both the grey and white matter of the brain, though the other constituents appeared practically normal. As regards the various parts of the brain in general paralysis, the cortex showed a greater variation from normal than the corpus callosum; the cerebellum and spinal cord showed perhaps less changes than the cortex but more pronounced ones than the corpus callosum, which was the least affected. [C. da Fano.]

Cooke, J. V., and Jeans, P. C. TRANSMISSION OF SYPHILIS TO SECOND GENERATION. [*Am. Journ. of Syph.*, October, 1922, VI, No. 4.]

The present study emphasizes the author's belief in the value of the Wassermann reaction in the hereditary form of neurosyphilis. All mothers of syphilitic children are probably infected, although occasionally a mother of a syphilitic infant has a negative Wassermann. Mothers of older syphilitics frequently have weak reactions. The maternal infection remains latent. Strong positive maternal Wassermann reactions do not indicate that the offspring will be infected. These authors believe that when the mother's reaction is positive with the cholesterolized antigen only, the chances that the infant is not syphilitic are about seven to one. The father usually brings the infection, although their figures show that nearly 40 per cent of the fathers had negative Wassermans when the children were examined. The male may therefore transmit the disease

after his infection has become latent. Transmission to the third generation is possible, but difficult of proof. Single or identical ovum twins of a syphilitic mother are both infected or both escape; double ovum twins, on the other hand, have the same fate as children of two successive pregnancies, *i.e.*, either, neither, or both may be infected. Treatment of the syphilitic mother during pregnancy will often result in a nonsyphilitic infant if the treatment is instituted before the fetus is infected. Later pregnancies are not protected unless treatment is continued. Placentas of syphilitic infants show characteristic diffuse microscopic changes in 27 per cent of cases. When such changes are present the infant later proves syphilitic in every instance. Syphilitic infants at birth have Wassermann reactions in the following proportion: 37 per cent negative, 18 per cent weakly positive and 45 per cent strongly positive. After the first few weeks or months all syphilitic infants have strongly positive Wassermann reactions. Syphilitic infants over two months of age fail to show clinical evidence of the disease at one examination in 50 per cent of instances. Nonsyphilitic infants may give weakly positive Wassermann reactions at birth which become negative later, but never give strongly positive reactions at birth or any other time. Hutchinson's triad of interstitial keratitis, enamel defects of the upper central incisors, and nerve deafness are rare. In older children with active manifestations of syphilis the Wassermann reaction is positive in nearly every case. Certain possible exceptions are noted, keratitis being present in each case. A diagnosis of active hereditary syphilis in a child with a negative Wassermann reaction is justifiable only when the clinical evidence of the disease is beyond any question.

Roxo, H. SYPHILITIC ENCEPHALITIS OF BASE. [Braz.-Med., January 6, 1923.]

A thirty year old man had symptoms suggestive of brain tumor. The symptom-complex differed from the usual situation in certain respects. The c.s.f. Wassermann proved positive on one occasion, although consistently negative both in blood and fluid at other times. Antisyphilitic treatment brought about a recovery and the case was retrospectively diagnosed as a gummatous inflammation in the meninges and brain.

Terzani, A. SPINAL FLUID IN NEUROSYPHILIS. [Revista Critica di Clinica Medica, Vol. XXIII, No. 9, p. 109. J. A. M. A.]

Terzani describes and criticizes the various reactions that can be induced in the cerebrospinal fluid with disease of the nervous system, especially in neurosyphilis. He gives an instructive table of the findings with eleven different parallel tests in thirty-six cases, including three of tabes and three of general paresis. He regards Boveri's simple test as very useful. Although it is not specific for any special disease, yet it warns of the presence of an organic lesion, and often this is all that we need to know for management of the case. He pours along the wall of a

test tube containing 1 c.c. of the cerebrospinal fluid, 0.1 c.c. of a 1:1,000 solution of potassium permanganate (not 1 c.c. as often published). A yellow zone forms at the junction of the two fluids, or spreads through the whole if they are mixed. The intensity of the reaction is indicated by the promptness with which the tint changes; from two to six minutes is the accepted range for a positive response. In his series the strongest reaction was obtained with epidemic and tuberculous meningitis (half a minute to two minutes); in general paresis (one to three minutes); in acute poliomyelitis (three to four), and epilepsy (four minutes). The differential count of the cells in the sediment is also important. In one of the cases of tabes the Boveri reaction was pronounced although the Wassermann was negative.

Buschke, A., and Kroó, H. EXPERIMENTAL RECURRENTIS INFECTION. [Klin. Woch., Dec. 9, 1922, I, No. 50.]

After infections with the spirochete of recurrent fever in mice these observers found the organisms in the brain. They were present in large numbers in the cellular portions of the neurons, between the cells and in the glia. They did not find them within the ganglion cells nor in the fibrous portions of the neurons. The spirochetes had invaded the brain in large numbers twenty-four hours after the infection.

Boas, H., and Kissmeyer, A. CAN SALVARSAN CREATE A POSITIVE WASSERMANN REACTION IN THE NON-SYPHILITIC? [Uges. f. Laeg., March 29, 1923.]

H. Boas and A. Kissmeyer have investigated the claim made in 1920 by Strickler and others that in certain nonsyphilitic persons the injection of arsphenamin may provoke a positive Wassermann reaction. The authors point out that while an injection of salvarsan may sometimes activate the Wassermann reaction in the subjects of syphilis, the provocation of a positive Wassermann reaction in the nonsyphilitic by salvarsan is quite another matter, which requires critical investigation before it can be accepted as a dogma. They have come to the conclusion that there is no foundation for this teaching.

Diez, S. POST-TRAUMATIC TERTIARY SYPHILIS IN THE ACCIDENTALLY INJURED. [Policlin., 1922, XXX, Sez. Chir., 375. Med. Sc.]

Besides the direct implantation of infection by or in wounds, and apart from the influence of active syphilis on the healing and progress of injuries, it is of importance, from the medico-legal and insurance aspects to recognize the effect of trauma in determining a recrudescence of latent disease. There is abundant evidence that every kind of trauma—contusions, wounds, burns, fractures, dislocations, even blisters and hypodermic injections—may provoke a local gumma, and that every tissue and organ may suffer. The author reviews the literature and cites many interesting examples, including experimental work of Tarnowsky and

others. The most difficult cases are those affecting the nervous system, where the influence of physical trauma is complicated by a psychic element. Pathogenesis is not quite a simple matter. When the trauma affects directly the bone-marrow, where the spirochete may be considered to be resting, and when a new invasion of the blood-stream results, or when the existing, if unstable, general immunity may be upset by shock, fresh manifestations of the disease may be expected. But when the result, as is usually the case, is a gumma at the injured site without lesions elsewhere in the body, a local loss of immunity must be postulated, and the innate protective owners of the tissues themselves invoked. Possibly the *Spirocheta*, as some evidence goes to show, remains latent in other tissues than those of the hemopoietic system. There is also the question of the selection of the site of an old injury, callus or cicatrix, as the site of a syphilitic lesion due to a subsequently acquired infection. To establish causal connection with the trauma, three elements must be considered: the nature of the trauma and the alterations produced by it in the tissues, the interval elapsing, the site of specific lesion, and the present state of the subject. As regards the interval, some put it as short as six weeks, some extend it to six months, and others see no clinical limit even when a legal limit exists. In any case it should be established that there was no preëxisting lesion at the site injured or active signs elsewhere. Estimation of diminished wage-earning capacity must be considered solely in reference to each particular case. In the case that the author records at length, a man who had never been treated for syphilis and had had only one doubtful lesion since, at twenty-two, he had had three ulcers on the penis which were considered not to be specific; at the age of forty-two he suffered a severe contusion over the condyle of his femur. An arthritis resulted by which he was incapacitated for many months; although the fluid from the joint was injected into a guinea-pig with negative results, he was submitted to arthrectomy in another clinic and obtained no relief from his severe nocturnal pains. Subsequently a trigeminal neuralgia led to a blood test, which was positive, and a course of neosalvarsan not only cured the neuralgia but also banished the bone pains forthwith, so that he returned to work. In this case, despite the twenty years' interval since infection, the direct sequence, the localization, and the character of the lesion established the causal connection.

Lafora, Gonzalo R. THE INTRASPINAL TREATMENT OF NEURO-SYPHILIS.
[Rev. Neur., May, 1922.]

Gonzalo R. Lafora thinks that the intraspinal method of treating neurosyphilis is indicated only when there is active meningovascular or radicular inflammation and not when the condition is chronic and accompanied by sclerotic and parenchymatous changes. Different forms of lesion call for modifications in the frequency and dose of injection. Even one form of lesion (for example, tabes dorsalis) may demand modification of treatment according to clinical condition, age of patient, manner of

reaction to initial doses and the showings of spinal fluid examination. Definite cure of neurosyphilis in the tertiary stage, being less certain than hitherto thought, usually requires a combination of intraspinal with intramuscular and intravenous injections. Short courses of small doses are wholly inadequate. They merely reactivate the condition. The treatment of parasyphilis should be continued over years, even to the end of life. Bad results can generally be ascribed to the use of excessive doses too frequently given or to injudicious selection of patients for treatment.

Salvarsan Committee, Med. Research Council. SPECIAL REPORT SERIES.
[London, 1922, No. 66.]

According to the findings of this committee no special arsenobenzol preparation can be regarded as more likely than others to produce ill effects, and that errors in technique cannot account for more than a few accidents. The most important ill effects which may end fatally are: encephalitis hemorrhagica, acute yellow atrophy of the liver, and exfoliative dermatitis and its complications. Of these, the first named appears to have been the most frequently observed in Germany, while in England and America the second and third are more frequently recorded. *Encephalitis hemorrhagica*. About half the total recorded "salvarsan deaths" have been due to encephalitis. The symptoms appear from two to five days after injection and, for the most part, end fatally within twenty-four to forty-eight hours. It is believed to be commonest during the secondary stage of syphilis (that is, when most cases come under treatment), and its occurrence does not appear to be related to the particular compound used. The majority of cases occur after the second injection. The illness is ushered in by intense headache, shivering, vomiting, and sometimes by fever. On the following day the patient suddenly has an epileptiform convulsion with clonic spasms, followed by unconsciousness. The tendon reflexes are abolished, there is an extensor plantar response, and ocular palsies and other signs of central nervous involvement appear. Coma with intercurrent epileptiform convulsions continue until death. There is commonly retention of urine. Two views have been expressed as to the origin of this condition: that it is an acute cerebral syphilis of the nature of an "Herxheimer reaction": that it is a direct result of salvarsan, probably in susceptible persons. The bulk of evidence supports the latter view. Marschálko and Veszprémi appear to have given the most complete account of the morbid anatomy of the condition. Macroscopically, hemorrhages were observed in different parts of the brain, sometimes punctiform and sometimes larger when small hemorrhages were aggregated. These were most thickly scattered in the pons. No gross areas of softening were observed. Microscopically, minute capillary thromboses and hemorrhages were the characteristic lesions. A few cases are recorded of encephalitic symptoms with recovery. As to treatment, the committee suggests bleeding up to 18 to 20 ounces, the withdrawal of 15 c.cm. of cerebrospinal fluid by lumbar puncture, and intramuscular

injection of 1.5 c.cm. of 1 in 1,000 adrenalin. All these measures should be carried out as early as possible after the onset of symptoms. A somewhat rarer complication of arsenobenzol treatment is polyneuritis. Commonly it follows the development of dermatitis, but has been known to precede it. In some cases, it appears about seven weeks after the cessation of treatment, when this has been rendered necessary by the appearance of dermatitis. From the descriptions given the polyneuritis appears to have nothing specific in character, and resembles polyneuritis from other causes, with the addition of the skin changes seen in arsenical neuritis. [F. M. R. Walshe.]

Truelle and Others. THE TREATMENT OF PARESIS. [Rev. Neurol., 1922, XXIX, 921. Med. Sc.]

In 1822, Bayle, in his inaugural thesis, published when he was twenty-three, gave the earliest description of paresis as a clinical entity. The centenary of this important event was celebrated in Paris by a congress of neurologists and psychiatrists in May of this year, at which every aspect of the disease was discussed. Among the seven papers that of Truelle, with the discussion following it, is of the greatest practical interest. Truelle believes that at present paresis is an incurable disease. He reviews the various modes of treatment adopted, and from the oral administration of mercury to Wagner von Jauregg's malarial infection he attributes the results claimed, by each and every method, either to the ordinary remissions of the disease or to confusion with cerebral syphilis. In respect of palliative treatment, he lays stress on general hygienic measures, but since all general paralytics are debilitated individuals he regards drug treatment as requiring considerable caution.

Sicard expressed the view that the arsenical compounds given by the intramuscular route may arrest the progress of the disease in its early stages, but do not cure it. Rodriguez (of Barcelona) employed intravenous arsenobenzol and intrathecal salvarsanized or mercurialized serum, and claimed "satisfactory results." Eight others present, including Lhermitte, Anglade, Béhague, and Klippel, regarded all forms of anti-syphilitic treatment as ineffectual, when not actually harmful. [F. M. R. Walshe.]

Schussler, H. PLAN FOR INTENSIVE TREATMENT OF CONGENITAL SYPHILIS. [Calif. St. Jl. of Medicine, Vol. XX, No. 8, p. 257.]

This paper describes and advocates the following plan of therapy: Three intravenous injections of neo-arsphenamin are given at two day intervals. Three mercurial inunctions are given every seventh day for two months. Three more neo-arsphenamin injections are given at forty-eight hour intervals. Mercurial inunctions are then given for one month more. A rest period of a month is taken when a Wassermann is done. This program occupies four months. It is repeated regularly until the Wassermann test is negative, after which one more course is given with

step three omitted. Then all treatment is stopped, and the Wassermann is repeated every six months for three years. If all are negative, and no clinical evidence of the disease has appeared, the patient is considered as probably cured. Sodium iodid is given almost continuously to all patients over one year old, being omitted and a tonic of iron and cod liver oil substituted during the rest periods. If the patient has an active or open lesion, the initial series of neo-arsphenamin is increased to six injections on alternate days, the rest of the course being as usual. This first course is considered the most important, and it should be made intensive. In weak athreptic infants, the first arsenical series may be preceded by a week or two of mercury rubs. Spinal puncture is done (1) if the central nervous system is clinically involved; (2) if the Wassermann reaction is very resistant to treatment; (3) in cases with mental deficiency, and (4) at the time of the first negative blood Wassermann, if involvement of the nervous system has ever been suspected. Intraspinal treatment in children is rarely used and is not recommended for general practice. The dosage of neo-arsphenamin varies with the age, weight, arsenical tolerance, and general physical condition of the patient. It is much higher, in proportion, than the doses commonly used in adults.

Frank, L. W. TABETIC GASTRIC CRISIS RELIEVED BY SPINAL NERVE SECTION. [Ky. Med. Jl., October, 1922, XX, No. 10.]

Section of the posterior roots of the spinal nerves was of service in the relief of gastric crises in this case. The fourth, fifth, sixth and seventh segments of the dorsal nerve roots were divided on both sides. Some return of pain which persisted about a week occurred once only. The patient put on flesh, is in good physical condition and has been constantly at work for a year since the operation.

Solomon and Tait. EFFECTS OF ANTISYPHILITIC THERAPY. [Am. Arch. Neur. and Psych., 1922, VIII, 341.]

Solomon and Tait have had the unusual opportunity of studying histologically the brains of twenty-seven cases of general paresis which had been more or less intensively treated during life. For purposes of comparison, the brains of fifteen untreated cases were also studied. So far as parenchymatous, true vascular or neuroglia changes are concerned, no conclusions could be drawn because of the nature of the pathology of these structures in general paresis. The critical finding of diffuse plasma cells in the perivascular and pial infiltration could be fairly accurately compared in the treated and untreated groups. It was found that plasma cells were few and infrequent in most of the treated patients, and this was so uniformly the case that it was often possible to predict from the histologic picture whether or not the patient had been treated. Also both lymphocytic perivascular infiltration and pial infiltration were strikingly less in the treated than in the untreated group. Neither the age of the patient, the clinical variety of the psychosis, its duration, nor the kind

and amount of treatment given seemed to have any distinct bearing on the amount of cellular inflammatory reaction. They conclude that anti-syphilitic treatment of paretics does affect the histologic picture and that this is probably an evidence of lessened chronicity of the process.

Corbus, B. C., and O'Connor, V. J. THE TABETIC BLADDER FROM THE STANDPOINT OF THE UROLOGIST. [Jl. Am. Med. Assoc., Nov. 18, 1922.]

In the uncomplicated "tabetic bladder" cases, even when a residual urine of from 900 to 1,000 c.c. is present and the blood nitrogen is normal, these authors believe that the bladder should be undisturbed. Treatment in this class of cases should be limited to systemic management. Local treatment must only be instituted to combat imperative complications. Forced fluids during the day and urinary antiseptics are valuable in the earlier cases. It is best to avoid all local manipulation of the urinary tract if possible. In badly infected cases, with dysuria and frequency, interval catheterization and lavage of the bladder may allay the symptoms. Occasionally, they aggravate them. If a considerable quantity of residual urine is present, which is causing nocturnal incontinence and bed wetting, the best course to pursue is to pass a catheter, institute lavage and then empty the bladder when the patient is retiring. This may control the incontinence. In the most debilitated patients, marked improvement has been obtained by putting them to bed and inserting an indwelling catheter through which the bladder is lavaged three times daily. Subsequently, the cystoscope is a most valuable aid in differentiating a paralytic condition from a mechanical obstruction. It should be used only after a thorough routine has been followed. The possibilities of error in interpretation of the cystoscopic picture must be borne in mind.

Stewart, Purves. TREATMENT OF NEUROSYPHILIS. [Brit. Med. Journ., Oct. 7, 1922, II, No. 3223.]

This author concludes (a) that the most promising cases of neurosyphilis for intraspinal therapy are those of the meningovascular type, (b) that of the parenchymatous or metaluetic group, tabes cases are relatively favorable, whereas paresis and optic tabes are generally unfavorable. Cases of taboparesis do badly. Antisyphilitic remedies should be administered by the most efficient route, whether by mouth, inunction, fumigation, intramuscular or intravenous injection in all cases of neurosyphilis. In no case should remedies be directed exclusively to the nervous system. Old paretics with extensive destruction of cortical nerve elements are hopeless.

Rebattu and Gardère, H. TABETIC ARTHROPATHY OF THE HIP AND POSITIVE WASSERMANN REACTION IN A WOMAN OF SEVENTY-FOUR. [Presse Médicale, XXX, Nov. 11, 1922, p. 981.]

The writers report a case of tabetic arthropathy of the hip and positive Wassermann reaction in a woman of seventy-four. She had eight chil-

dren born at term. Her tabes apparently began at the age of sixty-six with a fracture of the neck of the femur, due to an arthropathy of atrophic type, revealed by X-rays. She has Argyll-Robertson pupils and no knee-jerks. The Wassermann reaction is strongly positive in blood and cerebrospinal fluid, and there is marked lymphocytosis of the spinal fluid; there is also aortic insufficiency. She has never had any sensory symptoms, and there is no ataxia. Her tabes, which seems to have begun with the arthropathy, has now ceased to progress. Probably it followed on syphilis acquired late in life. [Leonard J. Kidd, London, England.]

Adams. TREATMENT OF NEUROSYPHILIS. [Brit. Med. Journ., Oct. 7, 1922, II, No. 3223.]

This author's program is as follows: A preliminary course of mercury and iodid for an average of two weeks, followed by a series of from twenty to forty injections of from 0.45 to 0.6 gm. of novarsenobenzol at seven day intervals. After every fourth injection two weeks rest was given. Prior to each injection a saline aperient and slight curtailment of breakfast on the morning. Tabes, taboparesis, paresis, Erb's spinal sclerosis, chronic poliomyelitis, and meningovascular syphilis were among the symptom-complexes which are reported.

Gutman, J. EFFECTS OF MERCURY INHALATION ON ANIMAL ORGANISM. [Am. Jl. of Syph., January, 1923, VII, No. 1. J. A. M. A.]

Experiments are presented by Gutman in which the symptomatology and the gross and microscopic pathologic changes in the organs of animals (guinea pigs and rabbits) subjected to inhalations of mercurial vapors are described. A comparison is made between the effects of mercury when it is administered by inhalation and the effects of oral, hypodermic and inunction methods as described by Kolmer and Lucke. It was found that under like circumstances, the pathologic changes following the administration of mercury, in whatever form and by whatever route, are approximately identical. It was found that the toxic changes following mercurial inhalations consist of marked congestion of many organs, severe destructive processes affecting the intestinal tract and kidneys and lesser injuries to the liver, spleen, suprarenals and nervous system. It is also stated that the effect of mercurial vapors upon the respiratory system depends on their concentration and the manner of their administration. Strenuous inhalations of concentrated vapors induce serious pathologic lesions. Diluted vapors, smaller and less frequent dosage are not productive of harmful effects in the lungs. (To be compared with the editorial fulminations against inhalation methods in J. A. M. A.)

Barnes, Francis M. RELATIONSHIP OF SYPHILIS TO DISEASES OF THE CENTRAL NERVOUS SYSTEM. [Med. Clinics of N. Am., July, 1922.]

Neurosyphilis may produce clinical pictures which, casually, may easily be confused with almost any other disease of the central nervous system

and this, even after the most careful study and investigation. Wherever there is a possible underlying factor of syphilis, in any disease of the central nervous system, adequate antisyphilitic treatment should be given. However, the therapeutic test is not ultimately final and syphilis cannot be excluded simply because a patient supposedly syphilitic does not respond to antisyphilitic measures.

Urechia, C. I., Mihalescu, et Elekes. ARTERIOSCLEROTIC RIGIDITY, AND THE PYRAMIDOPALLIDAL SYNDROME. [Archives de Neurologie, 1923, No. 5.]

In making a comparison of these two syndromes the authors utilize three cases, in two of which there was a localized syphilis of the lenticular nuclei. The authors insist again upon the possible syphilitic origin of Parkinson's syndrome, the nature of which Urechia had already demonstrated the nature in a case previously published (Congres de Paris, 1921). [Author's abstract.]

Watkins, H. M. PARESIS AT DANVERS STATE HOSPITAL. [Boston Medical and Surgical Journal, Vol. CLXXXVII, No. 4, p. 137.]

This author maintains that routine antisyphilitic therapy should be begun in all cases of paresis. Practically no ill effects have been observed under intensive treatment. Twenty per cent are able to "carry on" outside by the aid of the social service department and outside clinics. Seventy-seven per cent of those in hospital are able to do some form of useful work, while, of the sixty-seven studied, only nine are in bed, and only four of those continuously.

Full and v. Friedrich. GASTRIC ULCER AND TABES. [Münch. med. Woch., LXIX, No. 34, p. 1246.]

This article states that the combination of tabes plus true ulcer is of more frequent occurrence than is to be gathered from the literature. He describes three such cases, in which the coexistence of tabes with gastric ulcer was clearly established. It is of interest to note that in these cases the degree of severity of the crises was in direct proportion to the height of the blood pressure of the patient. This corresponds with Pal's theory of "Gefässkrisen." The other symptoms observed, as hematemesis, hyperacidity, pylorospasm, and intermittent copious flow of gastric juice, were partly attributed to the ulcer and in part to the tabes. The intermittent flow of gastric juice was believed to have been caused rather by the tabetic changes in the central nervous system than by the local condition in the gastric mucosa. In fact, the very ulcer found in tabes is believed to be caused by the pathology of the latter. Both in tabes and chronic lead poisoning pathologic changes in the vegetative nervous system are found. In both these conditions gastric ulcer is frequent. It is therefore highly probable that the changes in the vegetative nervous system are responsible for the ulcer formation.

Thompson, W. SYPHILITIC BACKACHE. [Am. Journal of Med. Sciences, Vol. CLXIV, No. 1, p. 109.]

Syphilitic spondylitis caused a severe backache in the two cases reported here. The pathology is similar to syphilis of bone elsewhere in the body. The nervous manifestations depend on the part of the vertebral column involved and the extent of the morbid process. The diagnosis is by (1) the Roentgen ray, (2) evidence of syphilis elsewhere in the body, (3) the Wassermann test, and (4) the therapeutic test.

Klauder and Kolmer. WASSERMANN TEST WITH CHANCER FLUID. [Arch. of Derm. and Syph., May, 1922.]

A syphilitic chancre when squeezed will yield a fluid which will react positively to the Wassermann test at a period earlier than when the reaction occurs in the blood. The fluid may be obtained by aspiration by means of a small rubber bulb attached to the end of a fine capillary pipette, and when insufficient juice could be obtained in this way the chancre was washed with saline and the diluted excretion still gave a strongly positive reaction. The presence of a trace of blood made no difference to the delicacy of the test; secondary bacterial invasion showed no disturbing effect; and local treatment with a spirocheticidal drug, although causing the disappearance of the spirochetes from the surface, did not inhibit the local formation of the Wassermann fixing substance. The clinical value of the test in the diagnosis of early syphilis is of definite but limited value. It cannot replace the simpler method of discovering spirochetes by dark-ground illumination, but in those cases in which the spirochete search has been negative, or in which the chancre has been previously treated with a spirocheticidal drug, a Wassermann test with the chancre fluid will give a positive reaction before the blood test gives any indication of the infection.

Plaut, F., and Mulzer, P. SPINAL FLUID IN EXPERIMENTAL SYPHILIS. [Münch. med. Woch., Vol. LXIX, p. 498.]

According to the findings reported upon here pleocytosis is frequently the first sign of experimental syphilis in rabbits. Examination of the cerebrospinal fluid will show the inoculation has been successful before any other evidence, even before the site of the inoculation shows any reaction. Orchitis or the primary effect appeared only weeks or months after a number of positive tests of the cerebrospinal fluid had been made. The authors report that one rabbit developed testicular syphilis six months after inoculation, whereas cerebrospinal fluid pleocytosis was noted five weeks after inoculation. Pleocytosis was the only symptom in some animals and, during a long period of observation, no external signs of the infection were recognizable. It is thus evident that changes in the spinal fluid may be not only the first but for a considerable period of time (possibly throughout the whole course of disease) the only sign of rabbit experimental syphilis.

Bolten, G. C. LUES CEREBRI WITH THE FOUR REACTIONS NEGATIVE. [Nederl. Tijdschr. voor Geneeskunde, LXVII, March 3, 1923, p. 874.]

Bolten records a case of gumma cerebri in a woman of twenty-eight in whom the four reactions were negative. Her history showed that seven years before her marriage she ran the risk of contracting lues. She had very severe headache with frequent vomiting, and then diplopia for a short time. No clinical signs were found in the nervous system. Wassermann normal in blood and in spinal fluid, the latter not under increased pressure, and the number of its cells of anything too few; normal Nonne reaction. Vomiting continued, headache increased, and then appeared right oculomotor paresis followed by right abducens and trochlearis palsy. Then the light reaction of the right pupil almost vanished; that pupil was sometimes the wider of the two, sometimes the narrower. Next she had severe radiating pains in the areas of the first and second divisions of the trigeminus nerve, with diminished tactile sensibility and corneal sensibility. A tumor behind the orbit was probably present, and the great rapidity of its growth suggested a gummatous nature. Mercury cleared off all her symptoms in a few weeks' time. [Leonard J. Kidd, London, England.]

Omar, H., and Carroll, P. H. SEROLOGIC CHANGES IN NEUROSYPHILITIC PATIENTS DURING A PERIOD OF NONTREATMENT. [Am. Archives of Neurology and Psychiatry, Vol. VII, No. 6, p. 733. J. A. M. A.]

A selected group of nine parietic patients was studied by Omar and Carroll during a period of over six months, during which time no specific medication was administered. Eight of the nine gave findings which were uniformly positive in both the blood and cerebrospinal fluid. The laboratory findings remained practically unchanged during a seven month period of nontreatment.

Maclean, Swinnerton, et al. TRYPANOSOMIASIS. [Br. Med. J. Ed. Comment, 1922.]

When the discovery, in 1908-10, of scattered cases of human trypanosomiasis in Northeast Rhodesia and Nyasaland led to the appointment of commissions for their investigation (the Royal Society's Commission under Sir David Bruce in Nyasaland and Dr. Kinghorn and Dr. Warrington Yorke in Rhodesia) it was found that, in its morphology, its action on animals, and its reactions to culture and serums, the new trypanosome, *T. rhodesiense* of man, was indistinguishable from a trypanosome which infested the game of the same regions. So close was the resemblance that the investigators felt that they could come to no other conclusion but that the two trypanosomes were specifically identical, and that the big game was the main or only reservoir for Nyasaland sleeping sickness. On this conclusion was based a practical recommendation—namely, that an experiment in game destruction should be made under scientific con-

trol. An area was to be selected and, after certain preliminary statistical investigations, the game in it was to be completely eradicated, and the entry into it of game from other areas prevented by a suitable barrier. In two or three years the population, the livestock, and the tsetse fly were to be examined again. Even if the fly had not then disappeared owing to the absence of the game it might at least be found that it had become noninfective. In either event the policy would then be to kill and drive away game in the neighborhood of human habitations and roads.

Both the experiment and the policy were recommended by the Inter-Departmental Committee, which reported in May, 1914, but the validity of the conclusion which had first prompted these suggestions had already been seriously questioned. It was pointed out that in vast areas of Africa *Glossina morsitans*, human beings, game, and *T. brucei* were present together, and that the incidence of Nyasaland sleeping sickness would be far higher were this trypanosome pathogenic to man. Taute even inoculated himself repeatedly, and, at a later date, he and Huber inoculated themselves and 129 natives, many of them debilitated, with the game trypanosome, without obtaining a single positive result.

Duke, however, in 1919, published in respect of the Uganda disease the suggestion that, man being highly resistant to trypanosome infection (a criticism of Taute's experiments which had already been made), human trypanosomiasis in epidemic form can only be brought about, and is brought about, by repeated transmissions of the trypanosome from man to man direct; in the laboratory it is often possible by this method to render virulent for a particular species of animal a strain of trypanosome to which it was previously refractory, and Duke suggested that this mechanical transmission was effected in nature by *G. palpalis* itself, and that the crowded canoes, accompanied by tsetses, of the Victoria Nyanza provided the ideal condition. If this were applicable to *G. morsitans* also and the scattered cases of Nyasaland, it followed that Taute's experiment had not gone far enough, and that *T. brucei*, transmitted directly from man to man, might after all be capable of giving rise to *T. rhodesiense*.

The next light on the problem has come from an outbreak of sleeping sickness of the *rhodesiense* type in the country south of the Speke Gulf, in the Mwanza District of Tanganyika Territory, about six and a half degrees farther north than the most northerly cases of the disease previously recorded, though we now have news from Dr. Archibald of a discovery of *rhodesiense* sleeping sickness in the Sudan. The Mwanza outbreak, which began probably about 1917 and comprised a few hundred cases, is interesting for at least two reasons. In the first place, the disease prevailed as an epidemic, a new feature in the Nyasaland type; and secondly, it was carried, not by *G. morsitans*, but by a new fly of the same group that has been described by Major Austen as *G. swynnertoni*. The outbreak was discovered by Dr. G. Maclean, of the Medical Department of Tanganyika Territory, and has been investigated in turn by Mr.

Swynnerton and by Dr. Duke. Each has now published his account of it.

Merzbacher, L. MALARIA TREATMENT OF PARESIS. [Sein. Méd., Aug. 21, 1924.]

This author's experience has impressed him with the profound influence which malaria exerts upon paresis. In four cases it was followed by pronounced benefit. Even allowing for possible natural remissions, no one could count on 50 per cent remissions in such a brief time, as was realized under the malaria treatment.

Nixon, C. E., and Naito, K. COLLOIDAL GOLD TEST ON ORIGINAL AND ULTRAFILTERED FLUIDS AND SERUMS. [Arch. of Int. Medicine, Vol. XXX, No. 2, p. 182. J. A. M. A.]

It is evident from experiments made by Nixon and Naito that two factors are concerned in the colloidal gold reaction. In fluids giving a curve there is present a precipitating substance; there may also be present a protective substance which modifies the action of this substance. Both precipitating and protecting substances are present in pathologic cerebrospinal fluid. Curves in Zones I, II and III are due to varying amounts and proportions of the precipitating and protecting substances. Albumin and globulin may possess both precipitating and protecting power. Ultrafiltrates of syphilitic and nonsyphilitic serums give curves that are more or less similar, but there tends to be a greater difference between the zones of reduction of the original and filtered serum in syphilitic than in normal cases. The protecting substance is decreased by ultrafiltration to a greater degree than the precipitating substance. Changes in the state of the protein modified precipitating and protecting powers. The salt solution used in the colloidal gold test partially neutralizes the protective action.

Herrold, R. D. THE PRECIPITATION TEST FOR SYPHILIS OF CONCENTRATED ARACHNOID FLUID AND SERUM.

The ring or contact precipitation test for the diagnosis of syphilis has been successfully applied to the arachnoid fluid by means of a single and practical method of concentration. This is accomplished by adding a saturated solution of ammonium sulphate to the fluid, and redissolving the precipitate in physiologic sodium chlorid solution in a quantity equal to a fractional amount of the original fluid. The euglobulin fraction has been found to contain almost all of the syphilitic antibody or "reagin" in serum, as indicated by the precipitation and Wassermann tests of solutions of fractional precipitates obtained by the ammonium sulphate method. The precipitated fraction containing the "reagin" in serum may be dissolved in physiologic sodium chlorid solution in amounts much less than the original quantity of whole serum, and, thus concentrated, it gives a more sensitive test than the whole serum. A practical method for routine use has been described and applied to a series of 100 cases, the majority being in patients treated for syphilis in most of whom the serum was either weakly positive or negative on Wassermann test of the whole

serum; and the results in this series indicate that the method of concentration and ring precipitation gives a more sensitive test than reactions with whole serum.

Urechia, C. I. PSYCHICAL DISTURBANCES IN TABES. [L'Encephale, 1922, p. 289.]

In the two cases of psychical disturbance reported here the first was a neurosyphilis, the Nonne-Apelt and lymphocytosis symptoms were absent. The second involved the problem of "moral insanity" in a tabetic. At the autopsy several discrete lesions were found. The author concludes that the psychical disturbances of tabes are due to contributory syphilitic lesions in the brain. The modifications of character seen in encephalitis and also in epidemic typhoid are probably due to cerebral lesions. [Author's abstract.]

Urechia, C. I., et Elekes. NEUROSYPHILIS. [L'Encephale, 1922, p. 627.]

In the first case, a fifty-three year old paraplegic, who died of a pyelonephritis, autopsy showed atypical meningomyelitis with involvement of the cord at the same level. Although no mental symptoms had been observed a focus of inflammation of the cerebrum was found, chiefly of the nature of syphilitic endarteritis of the small vessels. There were also syphilitic nodules and glial rosettes in the brain, evidence of latent cerebral activity. The Wassermann reaction had been negative in both the blood and cerebrospinal fluid even after provocative injections. In a second case of paresis with miliary gummata there were also lymphocytic nodules in the hypophysis, the adrenals and foci of necrosis in the myocardium. Urechia and Elekes discuss the various questions which arise. [Author's abstract.]

Urechia, I. A., et Elekes. SYPHILIS OF THE SMALL CEREBRAL VESSELS. "NISSL-ALZHEIMER." [L'Encéphale, 1923, p. 240.]

The authors report the sixth case of this rare affection which Urechia has had the opportunity to observe. From the clinical standpoint the cases were those of cerebral syphilis. The disease had been under observation six years and seven separate lumbar punctures had all been negative to Wassermann. The microscopical examination showed a granular ependymitis, several foci of meningitis, and the Nissl-Alzheimer type of mixed arteritis, syphilitic aortitis, syphilitic meningitis, colloidal-calcareous infiltrations of the lenticular nucleus. The authors discuss the pathoanatomy of the situation. [Author's abstract.]

Urechia, C. I., et Rusdea. SCHIZOPHRENIC FORMS OF CEREBRAL SYPHILIS AND OF PARESIS. [L'Encéphale, 1921, p. 587.]

The schizophrenic syndrome in part or complete may often be observed in the course of a cerebral syphilis or of a paresis according to these authors. At times these symptoms can constitute a phase in the course of these maladies. They can appear in the beginning or in a period

of remission. In certain cases the catatonic symptoms can predominate throughout the course of the disease. From the anatomical point of view one finds various lesions usually of a somewhat anomalous form.

Urechia, I. A., et Rusdea. CHRONIC SYPHILITIC CHOREA. [Rev. Neur., 1922, p. 513.]

A case of Huntington's chorea syndromy with positive Bordet Wassermann in the blood and cerebrospinal fluid with albuminosis and lymphocytosis. There was also a pupillary rigidity and a loss of the right Achilles reflex. Alimentary levulosuria was positive. Amelioration after anti-syphilitic treatment. [Author's abstract.]

Urechia, C. I., et Mihalescu, S. FRIEDREICH'S ATAXIA OF SYPHILITIC ORIGIN. [Zeit. f. d. g. Neur. u. Psych., 1921, LXXI, p. 207.]

A classical case in a child of fifteen years of age with all the blood and cerebrospinal fluid reactions positive. [Author's abstract.]

Nicholas, Massia and Dupasquier. CAUSE OF HUTCHINSON'S TEETH. [Ann. d. dermat. et syphil., 1922, III, 321.]

In an extensive and interesting review the authors have endeavored to collect and correlate facts and observations tending to relate a group of clinical manifestations of osseous syphilis with one of the embryonal anlagen of the bones of the face, the "incisor bud" which as part of the frontal prominence has an origin different from the lateral parts of the upper jaw; the latter originate according to some authorities from the first branchial arch. This conception is of particular interest as applied to the origin of Hutchinson's teeth. These the authors regard as the products of a dystrophic influence upon the embryonal anlagen, and not as either a syphilid in the strict sense or as the result of damage to the developing teeth. They suggest that the dystrophic injury is to the "incisor bud" and not to the tooth germ as such. This accounts for the appearance of Hutchinsonian lateral incisors as well as central incisors, and explains also the existence of aplasias. The authors further suggest that future studies may suggest a relationship between the dysplasias of this region in heredosyphilis and cite Hutinel's observations on their possible relation to endocrine dysfunction. The authors collected nineteen cases, including three of their own, in which late gummatous changes were so exactly limited to the region developed from the "incisor bud" (intermaxillary bone) as to support strongly the belief that this part of the jaw and face preserves even in the adult a certain amount of autonomy in its reaction to the spirocheta pallida, and justifies the term "syndrome of the incisor bud." They emphasize that treatment is primarily medical treatment for syphilis, and not surgical intervention. The possibility of confusion of the gummatous process with alveolar abscess and maxillary cyst is pointed out.

Urechia, C. I., et Josephi, Ar. GLYCOSURIA DUE TO NEUROSYPHILIS. [Annales de Med., IX, No. 2.]

In this examination of at least a hundred cases they have found that in the insidious cases of neurosyphilis there is to be discovered in about 5 to 7 per cent of the cases a glycosuria without any other signs of the diabetic series. This glycosuria disappears under antisyphilitic treatment. They interpret this glycosuria as one of cerebral origin; probably a luetic plaque in the interpeduncular space. They report a case of glycosure in a case of radiculitis with irregular pupils and state that the medullary pathways of carbohydrate metabolic control may be linked up in the discussion of the neurology of metabolism. [Author's abstract.]

Barbier, H. THE IMPORTANCE OF HEREDITARY SYPHILIS IN INFANTILE ATROPHY. [Journ. de méd. et de chir. prat., July 10, 1922, p. 463.]

This author observes that until recently the atrophy of nurslings was confused with the so-called "gastro-enteritis." These patients suffer almost constantly from dyspepsia, upon which true enteritis is often grafted by accidental infection, but this has no direct connection with the original disease. The infection attacks not only the intestine, but the skin and the respiratory tract. The wretched state of the patients increases the gravity of any infection, and the greatest care should be exercised in maintaining scrupulous cleanliness by sterilizing clothing, etc., to prevent any pyogenic infection, which may lead to adenitis, otitis, bronchopneumonia, etc. The underlying cachexia is due to one or both of the following conditions: (1) hereditary or congenital conditions, (2) environment (and alimentation). Of these, the first preponderate, and greatly aggravate the dangers of faulty hygiene, but the child of healthy parents may become cachectic if improperly fed, and may be cured if the mother resumes suckling. Barbier then discusses the biology of hereditary disease due (a) to intoxications, or (b) to infections. Among the toxic agents, he places alcohol first, then lead, mercury, phosphorus, morphine, and cocaine. Barbier states that infections act in two ways: (1) by toxic action on the sexual glands, or (2) by attacking the impregnated ovum. Tuberculosis, syphilis and malaria are the most frequent infecting conditions. Thirty-three per cent of the author's cases had positive Wassermann reaction. Forty-two per cent of all cases are estimated as related directly to syphilitic infection. Specific treatment often gives brilliant results.

Key, G. J., and Pijper, A. SYPHILIS AND MENTAL DEFICIENCY. [South African Medical Record, Vol. XX, p. 142. J. A. M. A.]

In 217 cases of amentia Key and Pijper have, by means of the Wassermann reaction, demonstrated the presence of syphilis in 120, or 55.2 per cent. They have not been successful in observing any symptom, or group of symptoms, common to the cases giving a positive reaction. It is their opinion that the syphilitic virus cannot alone be responsible for the

amentia in all these cases. The chances are that some other predisposing cause is also present in most cases.

Graves, M. L. DIAGNOSTIC TYPES AND TREATMENT OF CEREBRO-SPINAL SYPHILIS.

The classification of luetic infections of the nervous system adopted by many authors: (a) meningo-vascular or exudative syphilis; (b) parenchymatous or degenerative syphilis, is simple and comprehensive. It recognizes the pathology, as well as the pathogenetic factors in the production of a very variable clinical complex. The exudation of cells throughout the vascular walls and perivascular tissues is often productive of well marked symptoms in an early stage of the infection of the nervous system and is of course responsible for the late manifestations produced by the long continued influence of the *treponema pallida* upon the delicate parenchyma of brain and spinal cord. The alteration of function begins at the moment of invasion of the nervous tissue and runs the gamut of sensory disturbances from simple parasthesia to complete analgesia and motor phenomena, varying from irritative to destructive lesions.

Incidence: Varies according to race, character of population, social conditions, urban or rural locations and other factors. The colored race of the South is extensively infected. My impression, though, is that colored people show a smaller percentage of active neurosyphilis than a similar number of whites.

The percentage of syphilitic persons suffering with neural syphilis varies from .4 per cent of all medical cases, according to Hazen, to 12 per cent of Hylman. The time of involvement of the nervous system after the original infection, is still unknown. Fordyce believes that syphilis of the nervous system probably begins in the first year of the infection. Dana places the invasion of the nervous tissue within the limits of six months to thirty years. The author believes he has seen neurosyphilis as early as the third month after the primary infection. Common forms coming under his observation may be classified as follows:

(1) Those exhibiting the complex of *Neurasthenia*. They exhibit headaches, nervousness, insomnia, inability to concentrate, incapacity for daily routine, mental inertia and early and easy fatigue; psychomotor depression with irritability; apprehension and anxiety; and increased somatic disorders, including constipation, diarrhea, indigestion, flatulence, belching of gas, nausea, bad taste in the mouth, particularly in the morning.

(2) *Depressive Psychosis:* Such cases present inhibition or paralysis of effort, a gradient of depression from the mildest to suicidal despair and great retardation or substantial suspension of coördinated thought.

(3) *Epileptiform Attacks:* They occur not only in children but in the young and even mature adults, with or without transient paralysis. Hereditary stigmata may be lacking. Juvenile headaches, eye strain, general ill health, inability to keep up school work and certain listlessness

or silliness may be in evidence, and inability to progress may precede for some time the more active epileptiform attacks. Sometimes sudden convulsions with slight or temporary hemiplegia, strabismus or some uncontrollable mental or motor activity show overwhelming hematological and spinal fluid evidence of active neurosyphilis.

(4) *Erb's Spinal Paraplegia* may occur within a very few years after the initial lesion. The author has seen cases going on to destructive cord lesion, treated for neuritis and taken to bathing resorts, given massage and sweating, only to increase their spasticity and discomfort. Any sort of a careful examination would have avoided such errors.

(5) *Juvenile Paresis*: Infrequent. Perhaps overlooked in cases of underdevelopment, early imbecility, excessive silliness, uncontrollable nervousness, psychic indolence, motor instability, may be present confirming the diagnosis by the cytology and serology of the spinal fluid.

(6) *The Anterior Poliomyelitis Group*: Notably present in young adults. In childhood may be confused with the epidemic type of the disease, but usually the onset is slower and the progress more bizarre and irregular. Muscles of arm, shoulder girdle, neck and upper trunk more likely to be invaded.

Anamnesis frequently impossible or gives no information. Comprehensive physical examination may give negative results as some cases are asymptomatic for a considerable time, as noted by Fordyce, and are frequently baffling, especially when complicated by other diseases. If we keep constantly within our horizon the suspicion and possibility of lues, then make careful examination, including serology and cytology of the spinal fluid, error will be less frequent. The recent extensive occurrence of encephalitis lethargica with its protean clinical symptoms may be mistaken by the unwary.

A simple therapy in painful and exudative cases, early. Sodium or potassium iodide in rapidly increasing doses is believed to be helpful in the removal of pain and local or temporary paralysis. Mercury intramuscularly in the form of salicylate weekly or bi-weekly, decreased when the disease is under control. This procedure followed for six or eight weeks and then intermitted with shorter intensive courses until evidence of recovery is satisfying or an impasse reached. Greatest reliance upon salvarsan or neo-salvarsan with initial dosage of .3 gram intravenously at five and seven day intervals, lengthened or suspended upon evidence of intolerance, such as parasthesia, pain, dermatitis in any degree, puffiness of face, or extremities, renal irritation or jaundice in any degree. Intravenous and intraspinal injections by the Swift-Ellis Ogilvie modification is a most valuable procedure. Injections repeated at variable intervals of from four to six weeks with increasing dosage and continued to symptomatic and serological recovery, if such be possible.

The author has seen arrest and improvement in such cases far beyond that experienced by other methods of treatment. The general health

needs of the patient may be met by rest, diversion, hematinic and nerve tonics, hydrotherapy, massage, muscular reëducation and attention to nutrition and elimination. [Author's abstract.]

Spackman, E. D. TEN CASES OF DELAYED CONGENITAL SYPHILIS. [Lancet, July 8, 1922, Vol. II, No. 5,158, p. 65. J. A. M. A.]

Eight of the ten cases reported by Spackman occurred in full grown serving soldiers, whose ages were between nineteen and thirty-one years; the two civilian patients were aged seventeen and sixteen years, respectively. In the eight cases there were no signs of a syphilitic breakdown until the men were engaged in the strenuous work of war. Further points of interest in these cases are that four out of eight soldiers were passed into the army as A 1—and that six out of the eight were actually serving in France when their syphilitic symptoms appeared, four of them being combatants in the front line. Syphilis hereditaria tarda, Spackman says, is not a rare disease, and should be diagnosed more frequently than it is in adult life. Aortitis or aneurysms may have a congenital origin and not be the result of acquired syphilis. All cases of syphilis, congenital or acquired, should be placed in the hands of those competent to treat them, and if any permanent benefit is to be expected such treatment must be intensive and thorough. Disease of the eye, in the form of interstitial keratitis, iritis, or choroiditis, often one of the earliest signs, is of great importance in early diagnosis.

McFarland, A. R. BLOOD CHOLESTEROL IN SYPHILIS. [Arch. of Dermatology and Syphilology, Vol. VI, No. 1, p. 39.]

High cholesterol percentage is not the deciding factor in the Wassermann blood reaction according to this study. In fact, he says, blood cholesterol values in syphilitic patients, in general, tend to be medium and low rather than the opposite. Arsphenamin given and the time between injections do not affect the cholesterol. Apparently there is no relation between the cholesterol values and the clinical and serologic response of the patient. The only recognizable relation between blood cholesterol values and the clinical type of syphilis is the large proportion of high cholesterol estimations in neurosyphilis.

III. SYMBOLIC NEUROLOGY.

1. NEUROSES; PSYCHONEUROSES; PSYCHOLOGY; PSYCHO-ANALYSIS.

Herbert, S. A CHILD'S BIRTH-MYTH STORY. [Int. Journal of Psycho-Analysis, June, 1922, Vol. III, Part 2, p. 187.]

Nesta is nine years old and has had a liberal education in sex. She was enlightened as to the origin of children in early childhood; and now, as her interest in sex is reviving, the lesson has been repeated to

her. This is how she elaborated the newly-won knowledge in her own mind: She was going to tell a story and asked what it should be about. "About a red berry" was the request; whereupon she told the following tale spontaneously, given in her own words: "There was a berry, alone on a bush, and her husband had been plucked off, and she was so sorry, because she wanted to have some children. Then a little red berry rolled along near her, and she asked who it was, and it said: 'Somebody plucked my mummy and daddy, and so I am all alone, and have nobody to take care of me!' Then the old berry said it had no children, and would the little berry be its child, and it would be its mother. So they agreed, and lived together. After a while, one day the mother said to herself: 'I wonder why little Reddy is scratching herself so much. Why are you, Reddy?' 'O mummy, I have to scratch, because I feel as if there's something inside me.' 'Oh,' said the mother, 'we must go to the doctor.' So they went to Dr. Berry, and he said she must be cut open. So he laid her on some soft moss." ("Didn't she have chloroform?" asked the listener.) "O no, but he poured some dew on her, which is the same as chloroform for berries. Then he cut her open, and out came a little thing with two legs, two arms, and two wings. It was a fairy. It said it had been caught in a flower in the spring and made a prisoner, and then felt something growing around itself, and that was the berry. So then it flew away. Then the berry woke up, and it was quite well, and it gave the doctor three bottles of rose water."

What is interesting about the above story is the fact that, though the sex information was given in a strictly rational, scientific manner, still the child felt the need of elaborating unconsciously in her own language and images knowledge that she already had consciously. The "mythopoetical" faculty is very strong in Nesta, and it enabled her to express in her own symbolic way what had occupied her mind intently for some time without her venturing to give open and direct expression to it.

Her symbolism conforms entirely to what we are used to find in psychoanalysis. In the first place there is the reversal so characteristic of the unconscious. While the offspring grows inside the mother, the story has it that the berry grows around the fairy child, forming a receptacle for it. This receptacle has much greater resemblance to the idea of a "box" which so often stands symbolically for the womb. Secondly it is not the old mother-berry, bereft of her husband, who gets with child, but little Reddy herself, thus showing a reversal of generations. Little Reddy identifies herself with her own mother and becomes thus, as it were, the mother of herself. As a matter of fact, Nesta often mentions that she is going to have a lot of children; she simply carries out her wish in the story.

Furthermore, it is interesting to note that Nesta represents the birth of the fairy as taking place by a doctor cutting open the mother. She had been told only that the child comes out of the mother at birth without any

further indication of the birth process; she represents the latter symbolically in the typical way by "cutting open" (it may be said here that Nesta's father is a doctor).

That Nesta has a special attachment for her mother, whom she strongly resembles, is quite clear from the story, though of late signs have not been wanting which indicate that she is nearing the period of father fixation.

Asked why Little Reddy scratches herself when with child she naïvely answers: "Wouldn't you do so if something were wobbling about inside you?" The displacement of the internal sensation to the skin gives a hint that skin erotism may sometimes be due to pregnancy phantasies. Finally it may be pointed out that Nesta asked the following day whether cats can have young without a husband. Though told that the male partner is necessary for reproduction, she had not been informed the exact rôle he plays. [Author's abstract.]

Solomon, Meyer. MAKEUP OF THE NEUROTIC. [Illinois Medical Journal, December, 1922.]

The main contention of this paper is as follows: All of us are in a state of unstable equilibrium. The neurotic, who is more sensitive than the average person, is in a state of relatively greater unstable equilibrium than the average individual, is subject to disequilibrium more easily, more frequently and more markedly than his average fellow-man, and must struggle for poise and equilibrium more constantly, vigorously and persistently. The problem of the neurotic reduces itself to a study of the causes and manifestations of the disequilibrium and of the efforts to gain poise and equilibrium. The causes of nervousness are not discussed in this paper.

The neurotic's disequilibrium. The lack of balance or equilibrium in the neurotic is shown by the following traits:

1. Relatively increased nervous instability. There is oversensitiveness, overreactivity, undue irritability or pathological excitability. This is nervous system irritability at one or more levels in the nervous system. This is seen typically in the neurotic's disturbed equilibrium from noise or sudden or excessive stimulation, irritation or shock of any sort, internal or external.

2. Oversuggestibility, which may be general or special. If general, the oversuggestibility may lead to excessive credulity or uncertainty, overflow of ideas with multiple tendencies and resulting mental conflicts, indecision, doubts, scruples, distractibility, circumstantiality, mental confusion, and the desire to do too many things at one time. Special suggestibility is shown by marked habit formations, with fixations, stubbornness, single-track-mindedness, and excessive domination by ideas.

3. There is a greater than the average lack of control, restraint, domination or direction of self, with relatively deficient powers of

inhibition, suppression or repression. This may show itself in the patient's thinking, emotions, speech, behavior and decisions.

4. Nervous and mental excitability exist and produce impulsiveness and explosiveness. Very characteristic and troublesome is the tendency to rush and hurry. This is responsible for the tendency to or craving for the immediacy of execution of ideas, wishes, desires or impulses, with consequent impatience and jumping to conclusions, expression or action. Associated with this we find the tendency to emotionalism, anxiety and worry on slight provocation and of excessive degree. In other words, the neurotic is overcharged, driven too fast or powerfully by ideas, with resulting unrestrained activity or overintensity.

5. Fatigue results at one or more levels in the nervous system, producing functional symptoms, which may be visceral, skeletal, cerebral intellectual, emotional, or moral (will power).

6. Nervous and mental tension, stress, or strain is felt by the patient, with feelings of unrest, uneasiness and restlessness, evidences of which are seen in the patient's behavior and on examination—such as fidgetiness, constant wasteful bodily motions, picking nose or lips, biting the nails, etc., with exaggerated knee jerks, tremor of the extended fingers, etc.

7. Awareness of these conditions becomes more and more annoying, so that as time goes on the neurotic may develop feelings of insufficiency, incompleteness, unreality, strangeness, incapacity, insecurity, helplessness or inferiority. On this groundwork there may be built up marked self-consciousness, indecision, interrogations, doubts, scruples, obsessions, fears, depression.

8. Because of this, and because of the fundamental oversensitiveness and tendency to overreaction, difficulty of adjustment or adaptation to life results and revolves about one or more aspects of life: (a) physical health (visceral or skeletal); (b) nervous or mental condition; (c) moral-ethical-religious conflicts; (d) social contacts or relationships; (e) domestic-family problems; (f) politico-economic issues; and (g) special wishes, desires or ideals, may be the nucleus of the conflict, with a struggle between the needs, ambitions or goals, and the possibilities, handicaps or reality.

9. Fears and convictions of pathological type, especially concerning the physical or mental health, are common.

The neurotic's struggle for poise and equilibrium. The neurotic struggles to flee from the possibility of states of disequilibrium of the sort above mentioned, endeavors to hide his weaknesses, defects, handicaps, fears or strange feelings from others, and battles for nervous and mental poise, balance and equilibrium. To gain this end he employs various ways and means, frequently bizarre. In these efforts he often goes to extremes or excesses because of overreaction and wild, frantic, panicky, undirected struggles to gain harmony and equanimity with certainty and as quickly as possible.

Adjustment may go to extremes in the direction of flight or fight. Flight may lead to (a) so-called hysteria, with blind, unplanned simulation of visceral or skeletal disease; (b) exaggeration of or deception concerning the actual condition or situation; (c) such behavior reactions as excessive timidity, shyness, inaccessibility, fears, taboos, miserliness, self-isolation, self-pity, cringing, self-abnegation, self-depreciation, self-accusation, nonresistance, ascetism, depression, even suicide. Fight may result in a depreciation of others, with hate, anger, jealousy, fault-finding, blaming and accusing others; (b) expansion of self—overproud, overbold, boastful, bully type, etc.; (c) overaltruistic; and (d) psychoses of more pronounced degree, especially paranoid trends.

There generally results marked egotism, with morbid introspection, self-observation, self-absorption and self-analysis.

The struggle to avoid possible or actual annoying states and gain, preferably in one bound and for all time, satisfying states, with poise and equanimity as the end, results in the adoption of one or more of the following means: (A) Pharmacologic—habit or nonhabit forming drugs, including alcohol and morphine; (B) Physiological—relaxation schemes, rest, diet, hydrotherapy, electrotherapy, physical training, massage, etc.; (C) Psychological, classified as (a) medical, such as explanation, suggestion, persuasion, reëducation, hypnosis, analysis; (b) nonmedical, the so-called health and faith cures (Christian Science, New Thought movement, etc.); (c) general philosophic viewpoints, religious especially; (d) false or extreme goals or ambitions, with vague searching for an indefinable acme of serenity, certainty, security, perfection, health, wealth, freedom, power, equality, normality, superiority, even to omniscience or omnipotence; (e) peculiar habits to control the tendency to hurry and avoid annoying feelings, such as walking very slowly, etc.; (d) excessive tendencies or cravings to action, such as abnormal desire for change and variety, vague and constant cravings for sensation and excitement, mysticism, cultism, etc.

The rôle of mental conflicts. Although the neurotic or irritable individual is more apt to have excessive and prolonged disturbing mental conflicts, the latter are often the result and not the cause of the neurotic condition. But mental conflicts may of themselves produce nervous upset or aggravate the neurotic makeup or traits, a vicious circle resulting.

In his "First Principles" Herbert Spencer stressed equilibration as the main tendency of evolution. Spencer's views apply to the universe, the average human being, and the neurotic, who is but an exaggeration or magnification of the average or normal. [Author's abstract.]

Keller, K. TOBACCO AND NEURASTHENIA. [Med. Klin., Sept. 3, 1922, XVIII, No. 36. J. A. M. A.]

Keller has been studying in the last fifteen years a number of neurasthenic subjects who repeatedly break off smoking for a time and then resume it again, the effect of the long period of suspension throwing light

on the nature of disturbances for which the tobacco is responsible. He refers in particular to the sudden sharp pain in the interior of the skull, like that from horseradish fumes. This is one of the earliest symptoms in young neurasthenics, and it generally puts an end to the smoking habit. The headache from the remote action of the tobacco appears only after smoking has been given up, and it may persist up to two months. Dizziness may be another remote symptom from the action of the tobacco on the neurasthenic; scarcely appearing during the smoking period, it develops first when tobacco has been given up. Young neurasthenic smokers may have peculiar attacks of pain in the heart or stomach region, like a muscular cramp. The attacks may be brought on by the slightest noise, even the buzzing of flies. The attacks may return several times a day, but stop at once or at most in a few days when tobacco is dropped. The attacks may be worse at night; the striking of a clock may bring one on, the subject waking in fright and finding it difficult to go to sleep again. It is evidently a reflex phenomenon. The sounds thus rousing from sleep seem to be magnified, the striking of the clock sounding like an explosion. The prompt subsidence of the attacks when smoking is discontinued testifies to the cause. The nicotin affects the peculiarly predisposed neurasthenic brain stem, irritating it, but not enough to exhaust and paralyze it.

Kläsi, J. CONTRIBUTION TO THE QUESTION OF THE CHILD'S SEXUALITY. [Zschr. f. d. ges. Neur. u. Psych., Vol. LXXIV, Nos. 1-3.]

Kläsi presents a series of bright little anecdotes from child life which go to show that there is no awaking of the sex feeling in the sense of its becoming manifest after a previous complete state of quiescence. The sexual instinct he believes can manifest itself in the very earliest period of life, at least in the psychic territory, with all the special characteristics found in adults. It depends upon external circumstances whether sex acts will take place so that they can not be taken in a diagnostic sense. The behavior of children in relation to love is a characterological sign which often is of illuminating value in determining the type of experience.

Stibbe, F. S. EYE DISTURBANCE IN HYSTERIA. [Ned. Tijds. v. Gen., Dec. 23, 1922, II, No. 26.]

A young man and young woman, natives of Java, had visual disturbances consisting of concentric contraction of the field, achromatopsia and dyschromatopsia, with diplopia in one eye which was not changed after atropine drops.

Miles, W. R., and Root, H. F. PSYCHOLOGIC TESTS APPLIED TO DIABETIC PATIENTS. [Arch. Int. Med., 1922, XXX, No. 767.]

Objective evidence of impairment of memory and power of attention in diabetes. In accuracy and quickness of movement the diabetics were also below the normal standard.

Maurer. STUDY OF THE BRAINS OF EMINENT SCIENTISTS, MUSICIANS, STATESMEN AND SCHOLARS. [Berlin Letter, J. A. M. A., March 17, 1923.]

This anatomist, of Jena, has described in an interesting article the brains of eminent men and women. Maurer, by reason of previous investigations, is especially well qualified for such researches. In a former letter I gave an account of his researches on the brain of Haeckel, which he described in the *Deutsche medizinische Wochenschrift*. Maurer emphasizes that the first point to which importance attaches in the appreciation of the brains of great geniuses is weight, and, for this reason, many data have been published on brain weights, and some surprise and disappointment has, at times, been felt over the results—quite unwarrantedly, it would seem. Centers that serve both functions, if they are strongly developed, may help to develop a heavy brain, though the intellectual centers may not be developed. On the other hand, alongside highly developed intellectual centers there may be poorly developed centers for the bodily functions, which will explain why the brain of an eminent man may not have the weight that would naturally be expected. A heavy brain may be the result of hyperdevelopment of the neuroglia. Next after the weight, the most important consideration is the surface of the brain. It is a generally accepted hypothesis that in men of exceptional intelligence the surface of the hemispheres of the cerebrum has more numerous convolutions and deeper furrows between them than are found in ordinary brains. For intellectual work, these considerations are of importance: (1) the whole frontal lobe of the cerebrum; (2) the marginal and angular gyri of the parietal lobe; (3) to a certain extent, the upper portion of the temporal convolution, and (4) the precuneus on the inner surface of the cerebrum. According to recent investigations, the precuneus plays a part in the formation of space concepts.

Eminent men may be divided into two groups, which must be taken into consideration in the appreciation of their brains: (1) geniuses who, in addition to their special gifts, possess remarkable all-round ability, and (2) persons with quite one-sided gifts. In Group 2 may be classed famous musicians who, from their youth, have devoted themselves entirely to music; also many mathematicians belong to this group. The brains of these persons with one-sided gifts present, however, a special interest. The average weight of the brain in the male of the thirty to forty age group is about 1,375 gm.; that of the female, of the same age group, is about 1,245. Of the brains of eminent men of former times only the weight is known, and the data on even this point are not incontestable. The weight of Cromwell's brain is given as 2,233 gm., and that of Byron's brain as 1,807 gm., but Rudolf Wagner, one of the most versatile investigators on the brain, declares that these figures are too high; he likewise questions the reputed weight of the brain of Cuvier, which is given as 1,861 gm. Other reported brain weights are: Gauss, 1,492 gm.

(age at death, seventy-eight); Liebig, 1,352 gm. (age seventy); Bunsen, 1,295 gm. (age eighty-eight); Menzel, 1,298 gm. (age eighty-nine); Mommsen, 1,425 gm. (age eighty-six); Helmholtz, 1,420 gm. (age seventy-three). In recent decades, the brains of many eminent men have been examined. David von Hansemann examined the brains of Helmholtz, Mommsen, Menzel and Bunsen. Gustav Retzius examined the brains of a considerable number of distinguished Swedes of widely different callings; among others, that of the woman mathematician Sonja Kowalewska. In the brains of all the men mentioned, the convolutions of the frontal lobe were significantly well marked. But also certain other portions of the brain were well developed; for example, in the brain of Gauss the anterior portion of the lower frontal gyrus was highly developed, and in Helmholtz' brain, the precuneus. In the brain of Gambetta, the gyrus of Broca, the speech center in the inferior frontal gyrus, is said to have undergone a double development. In the brains of mathematicians, attention is called to the fact that the lateral portions of the frontal lobe show an especially marked furrowing. This was the case in the brains of Gylden and of Sonja Kowalewska (who, in other respects, had a typical female brain, with quite ordinary fissures). Researches on the brains of many famous musicians have been made, and according to the interesting study of Dr. Klose, who examined the brain of the eminent pianist Sokeland, who died at an early age, certain portions of the brain of musicians are highly developed; namely, the superior temporal gyrus, the inferior parietal lobule (the supramarginal gyrus) and the anterior and posterior central gyri. All these data seem to have little value when we learn that the brains of many men who have never become distinguished may present just as highly developed a structure as the brains of men who have been eminent. However, if the results of scientific researches are viewed rightly, their value will be understood and appreciated. "If one were to present to me the brain of an unknown person with the request that I state what the possessor accomplished in his lifetime, I would reject the inquiry as presumptuous. If, however, I take up the examination of the brain of a person whose career is familiar to me, I shall know to what regions of the brain, on the basis of previous experiences, I must pay particular attention, and I am sure not to be disappointed. I have gained this conviction from my study of the brains of Ernst Haeckel, Ernst Abbe and Ernst Stahl." Modern science has pointed out new avenues of approach that seem destined to prove significant for the examination of the brains of outstanding leaders. Through the researches of Brodman, we have learned that the finer structure of the cerebral cortex varies in the different regions of the cerebrum. For this reason, an estimation of the special significance of various portions of the brain, on the basis of anatomic facts, is quite possible. Brodman has prepared a brain chart, on which are designated many different characteristic divisions, some of which are sharply differentiated and some of which overlap each other,

to a certain extent. Unfortunately, these new criteria cannot be applied to the brains that have been examined in the past; but, in the future, these microscopic researches are sure to acquire great significance along with the microscopic findings.

Sahli. DEFINITION AND NATURE OF THE SO CALLED COMMON NEUROSES. (Nervousness, Neurasthenia, Hysteria.) [Schw. med. W., 1923, No. 1.]

The writer urges an analytical approach to the neuroses since they should not be considered as disease entities but as symptom groups to be in each case as precisely defined as possible with their pathogenesis traced. The author would comprehend nervousness and neurasthenia as intensity neuroses. The former represents an abnormal increase in potential, the somatic and mental functions participating in the nervous excitement. The latter represents a diminished potential so that the result is diminished functional capacity. This conception does away with the "scholastic bastard idea" of stimulable weakness. Psychoneurosis is a term also to be rejected as unjustified and misleading. Hysteria should be understood as localized anatomically or better stated ultra-anatomically. Sahli accepts its localization in the association system of the cortex, which he describes in its contrast to the projection system, following Flechsig, and the psychic functions such as thinking, feeling, willing and perceiving to which he prefers to designate the intercentral system. This system has the psychic functions such as thinking, feeling, willing and perceiving to perform as well as to make an anatomical connection of the sensibility and motility of the projection system to the content of consciousness. Hysteria concerns those functional changes of stimulability of the intercentral system, which may be considered as colloiddally conditioned and which have their effect in symptoms of paralysis or of excitement in the various somatic areas. Therefore Sahli would also discard the antiquated term hysteria for a more correctly descriptive term. The symptoms might be called somatic functional intercentral symptoms, or following Bleuler, somatic schizoneurotic intercentral symptoms, or one might speak of a schizoneurosis. Since it is the striatum that is involved one might use the term striatum disease, striatum neurosis or striatosis. The symptoms are only in part and not necessarily psychogenic. Psychotic complications may be present but they are not a part of the hysteria. [J.]

Bak, I. A CASE OF AUTOPHAGISM WITHOUT ANATOMICAL CHANGE. [Nederlandsch Tijdschr. voor Geneeskunde, LXVI, Nov. 11, 1922, p. 2170 (1 fig.).]

A strong middle-aged Javanese coolie became acutely ill with fever and cough, probably influenzal. He was somnolent, and had ptosis, incontinence of urine and feces, and loss of knee-jerks. Two days later hiccough appeared, and persisted till his death three weeks later. With increasing restlessness appeared choreiform, epileptiform, and tremor-like

movements. About eight days before his death it was noticed that after an unusually restless night he had eaten almost the whole of the terminal phalanges of his left hand. He died in coma, with bronchitic signs. There had been no objective sensory loss in his hand, and he plainly recognized pin-pricks; there was indeed some evidence of hyperesthesia. Microscopical sections of the cerebral and cerebellar cortex, pons, floor of the fourth ventricle, Sylvian aqueduct, medulla oblongata, and upper part of the spinal cord failed to reveal any change whatever. Possibly some focus in the neuraxis escaped detection, or the influenza virus exerted some invisible influence on the central nervous system. There was no evidence of uremia. [Leonard J. Kidd, London, England.]

Pearson, K. HEREDITY AND SCHOOL EDUCATION. [London Letter, J. A. M. A., Jan. 13, 1923.]

In a lecture delivered to school teachers, Karl Pearson said that the child is made by his parents, and all that teachers can do is to temper the steel. The physician and the teacher are not going to alter to any great extent the health or intelligence of the child. That did not mean that education was not possible, but that the material was given to them, and the teacher was not going to alter it. It was impossible to say that there was any significant increase of intelligence with age between four and nineteen. Quick or sullen temper was not modified with age, nor was shyness, conscientiousness or aptitude for athletics or handwriting. Kipling's strictures on "flanneled fools at the wicket, and muddled oafs at the goal" were not justified by the facts. Athletics generally went with quickness and intelligence. Referring to physical characteristics, Pearson said that medieval writers viewed red hair with suspicion, and in morality plays Judas was always given a red beard; but red-haired boys and girls to-day were the most conscientious, athletic and popular.

Müller, F. ON THE MENTAL LIFE OF A PROFESSOR OF MEDICINE. (Being part of a personal letter written by Prof. Friedreich Müller of Munich to Prof. Graham Lusk of New York, and published with the permission of both.) [J. A. M. A., Nov. 25, 1922.]

Dear Dr. Lusk:— . . . I hope you have received my Leiden address upon "Problems of Metabolism."¹ I felt compelled to put together my ideas on the subject of protein metabolism. I cannot completely accept the dynamic theory of protein metabolism of Rubner or of Grafe, and I wished to express the idea that it is essentially a *chemical* problem. Many favorite theories which have come down from Carl Voit are no longer valid in the light of modern chemistry. I am keenly interested as to how you will handle this problem in the next edition of your "Science and Nutrition." The analysis of the specific dynamic action will be an especially difficult point. I can interpret it only as a problem of internal chemical work.

¹ Müller, Friedreich. Deutsch. med. Wochenschr., 1922, Nos. 16 and 17.

You wrote in a recent letter that Benedict [S. R.] holds it to be an anomaly that I, as a clinician, should concern myself with these physiologic problems. The responsibility for this belongs not alone to my training in Voit's laboratory but also and especially to the circumstance that, as physician at the sick bed, my attention is constantly called to the significance of problems of metabolism, and because the physiology of metabolism has been stimulated to a remarkable extent through a study of the pathology of metabolism at the bedside of the sick man.

You should read the new book of Petrèn on diabetes. It suggests a number of new problems. On the other hand, I do not believe that the new English experiments on the subject of carbonic acid and oxygen tension in arterial and venous blood will inform us further. We are investigating the blood of the arteries and veins of the arm. The metabolism of the arm and of the hand is of very little importance in comparison with that of the liver and the kidney or even of the heart. Oh, if we could only compare the blood of the aorta with that of the inferior cava and the hepatic vein! The new experiments of Starling are of much greater clinical importance and are fit to establish upon a new foundation our views concerning circulatory disturbances and heart disease.

The clinical teachers are forced to follow the progress made by the pure sciences, chemistry, physics and physiology, because they throw some light upon the processes of disease in man. But we do not approach the sick bed as physiologists, but rather first of all with love toward the sick man and with an intense desire to help him. I believe that this human fundamental element must be inborn or one will never be the right kind of a physician. The clinical teacher must be primarily a good and experienced physician, and not one whose entire interest and experience are of the laboratory. He who does not heartily interest himself in his patient will never be a good clinician. This human, or, if you will, humanitarian, side of our profession is not only the most beautiful but also the most interesting part of it. It assumes an interest not only for the body but also for the mental individuality of the patient, and I can assure you that my afternoon consultation hours, in which I see patients from all the countries of the world, are to me at least as interesting as the work in my laboratory.

Personal contact with the patients during my consultation hours widens my mental horizon not only from a medical but also from an intellectual point of view, for difficult medical cases and interesting personalities from all classes of society come to me during these hours. I therefore find myself out of sympathy with the new American system of "full-time clinicians," which limits the activity of the clinician to a ward in the hospital and forbids private practice among those who do not wish to go to a hospital. I feel that the forbidding of private practice is not in accord with Holy Writ, as expressed in I Timothy, chap. 5, vs. 18.²

² "For the scripture saith, Thou shalt not muzzle the ox when he treadeth out the corn. And, The laborer is worthy of his hire."

In the laboratory we are still working on purely chemical problems, on the diazo reaction, on the nucleus, cholesterin, etc. All these matters are related to the problems of the physician, to fever and to gout. Besides this, work in physics is being done along the line of acoustics. As regards interpretation of the problems of auscultation and percussion, I feel that we have progressed very favorably and, using the method of Otto Frank, have replaced the former purely empiric impressions with clear-cut physical measurements.

To one method of approach in medicine I am fundamentally opposed, that of philosophical speculation, which to my great regret I find constantly increasing. But, of course, I do not include herein the wonderful psychologic ideas which, from a phylogenetic basis, have been developed by Karl von Monakow.

Hoffmann, H. CONSTITUTIONAL STRUCTURE AND DYNAMIC OF THE "ORIGINAL" COMPULSIVE NEUROSIS (Case Anna Reimert). [Zschr. f. d. ges. Neur. u. Psych., Vol. LXXX, Nos. 1-4.]

Hoffmann gives a detailed analysis of a case of compulsive neurosis. The neurosis arises out of a combination of perverse partial impulses of the sexual life and peculiar characterological traits, pedantry, scrupulousness, etc. The author finds that the facts bear out Freud's theories although he does not believe that repression of the impulsive wishes is a necessary factor. The compulsive symptoms which manifest themselves in the endogenous psychoses may have the same structure but the characterological traits arise as a part of the process or in an attack of illness. The writer believes that one should look for independent sexual perversities in families with compulsive symptoms.

Jelgersma, G. WAKING DREAMS. [Ned. Tijd. v. Genees., Sept. 16, 1922, II, No. 12.]

This term is here applied to dreams in which the action of the dream centers around some actual perception by the dreamer. He requested examples of such dreaming, and through the *Tijdschrift* thus collected 120 of them. The actual happening, as well as dream analysis, shows that a dream runs its course in a moment. It is a short-circuiting, as he explains, and he queries whether in waking hours we may not sometimes experience in the same way a massing of ideas and remembrances in a brief moment, as when persons think they are drowning. This seems to be a counterpart of the dream.

Dockeray, F. C. ATTENTION, DISTRACTION AND FATIGUE. [Jour. Comp. Psych., 1922, II, 331-370.]

These experiments were designed to study certain psychological factors involved in the capacity for mental work under various conditions of distraction and mental and physical fatigue. In the first series four complex sounds, produced by telegraph sounders tuned nearly alike, were

presented in irregular order, one every second. The subject was to select a given sound according to a prearranged signal and press a key whenever this sound occurred. The occurrence of the sounds and the subject's reactions were recorded automatically. An electric buzzer and induction shocks as distractors and various types of mental and physical work alternated with normal periods. The results indicated that the task is a severe test of ability to discriminate, but involves a narrow span of attention. It is well adapted to determine individual differences in ability to overcome distraction, but for fatigue studies, due to the simplicity of the task, the results are complicated by compensatory effects.

In the second series the test involved a much broader span of attention. Two sounds and three lights of slightly different intensities were used as stimuli. The subject was required to react to each stimulus by inserting a stylus in the proper hole, touching a plate beneath, in the proper time. If the reaction were correct a lamp flashed beside the plate. Contacts with the sides of the holes were also recorded. The performance thus involved discrimination of sounds, discrimination of lights, selection of proper reaction, and speed and accuracy of coordination. In these respects the task resembled the air service test developed at Mineola with the addition that the results were recorded automatically. The test proved sensitive as a measure of ability under various conditions of fatigue and at different times of the day. Only one subject showed any capacity to compensate for the effects of fatigue or loss of sleep. A tendency to shift attention either to the stimuli or to the reactions resulted in the same loss. Even in the case of the exception, an unusual subject in all tests, the average of his results conform to the same tendencies shown by all other subjects. The test should prove fruitful in the study of the psychological effects of various types of work, low oxygen, ventilation, tobacco and drugs. [Author's abstract.]

Chelmonsky, A. RÔLE OF BODY LESIONS IN TRAUMATIC NEUROSES. [Rev. Méd. d. l. Suisse Rom. Aug., 1922, XLII, No. 8.]

The author repeats an old "and questionable" dogma that persons with grave bodily injury from trauma very seldom develop a neurosis. Those actually crippled by an accident never develop one. It seems plausible to admit that serious bodily injury protects the injured to a certain extent against traumatic neuroses: They know positively that their disability entitles them to an indemnity and they do not have to worry about money damages. These dogmas have no real foundation in actual experience.

Trepsat, C. PSYCHOANALYSIS IN TREATMENT OF TIC. [Progrès Médical, Vol. XXXVII, p. 182.]

This case report records the apparent cure of a man of twenty-seven with an intense tic of remarkable frequency—a spasm of almost the entire body. He used what he calls the psychoanalytic method. The emotional

complex which is the origin of the tic should be looked for. A tic, he says, when not somatic as in encephalitis for example, is an indication of repressed impulses. Vosomotor, secretory and motor disturbances may accompany the tic. The will and especially the motor functions should be reëducated, and psychoanalysis is the best method to use for the purpose.

Garvey, J. L. HYSTERIC HOMONYMOUS HEMIANOPSIA. [American Journal of Ophthalmology, September, 1922.]

Hemianopsia caused by hysteria is a rare condition. Wilbrand and Saenger do not believe it can be caused by a purely functional neurosis. The case reported in this article was in a woman who complained of loss of the left half of the field of vision over a period of three months. The visual fields showed a left homonymous hemianopsia. The neurological and general physical examinations were otherwise essentially negative except for signs of hysteria. After five days of treatment with static electrical treatments and suggestion, her visual fields were normal. Since this time, a lapse of about seven months, she has remained well. The history, findings and subsequent course seem to justify the observation of hysteric homonymous hemianopsia. [Author's abstract.]

BOOK REVIEWS

Kafka, Gustav. HANDBUCH DER VERGLEICHENDE PSYCHOLOGIE. BAND I. DIE ENTWICKLUNGSTUFEN DES SEELENLEBENS. [Ernst Reinhardt in München.]

This is a volume of a projected system, or Handbook of Comparative Psychology. Three volumes have appeared to date. The present volume alone will occupy our attention. Vols. II and III will be reviewed later.

The Development Stages of the Psyche or the Soul is the general title of this initial contribution, Kafka himself writing five chapters on Animal Psychology, R. Thurwald the Section on Primitive Man, F. Giese those on the Psychology of Childhood, in the pre- and post-pedagogic periods. The whole makes up a volume of some five hundred pages with excellent bibliographies.

It will be seen that the editor does not mean by comparative psychology, only the psychology of lower animals, but all psychical activities. Purely dynamic conceptions prevail and the origins of later arriving complex psychical situations are led back to the study of stimuli, tropisms, taxis, and related simple phenomena. Thus psychology, considering the behavior of the animals as a whole, began with the protozoa. Touch and temperature, static stimuli, auditory stimuli, chemical stimuli, olfaction, taste, light, these are among the simpler energy sources set forth and analyzed, out of which the ascending complexities of later arriving psyches are built up by conditioning of reflexes and the engram binding into mnemonic activities, instincts and habits. These are the general concepts set forth in this first section.

Thurwald, in his chapter on Primitive People, says there are no more primitive people. Those still living are vastly further along than those which with propriety might be termed primitive. This is a very scholarly and complete though concise discussion which merits a lengthy appraisal—as does also the final chapter on Child Psychology. There we are hindered from considering *in extenso*, and would briefly express the opinion that this projected work promises to be one of great service to modern students of all matters psychological.

Schuster, Julius. SCHMERZ UND GESCHLECHTSTRIEB. [Curt Kabitzsch, Leipzig.]

Sadism and masochism have attracted much attention and have been redundantly obfuscated and illuminated by scores of observers. The outstanding conscious types are extremely rare. The outstanding cases are mostly products of journalistic rah-rah-rah! usually

prodigious lies—and almost invariably founded on obvious or hidden legal blackmail and allied corrupt exploitation of rich morons. The many minor unconscious types of masochism and sadism, however, are almost universal phenomena and are in great need of study and elucidation, since they result in much misery and suffering in the world.

Schuster's recent contribution contains a very concise statement of the problem, some interesting case histories and a few pages of interesting biographical material upon Sade and Sacher Masoch.

Külpe, Oswald. VORLESUNGEN UEBER PSYCHOLOGIE. Zweite Auflage. Herausgegeben von Prof. Karl Bühler. [S. Hirzel, Leipzig.]

Külpe's Grundriss de Psychologie has been since 1893 a standard and useful text for a number of years, since its initial appearance, and is here replaced in great part by the author's Vorlesung which was published in 1919 and which constituted an entire recasting of the older material.

The many recent advances stimulated Külpe to these lectures, the revision of which was interrupted by his death and now made possible by one of his pupils.

As one rapidly reviews its pages one is struck by the practicality of his vision concerning the material of psychology. Here is no cut and dried scholastic one-sidedness, nor yet its opposite tendency to hazy conceptions, but a judicious dealing with the many-sidedness of that most intricate and complex field of human functioning: the psyche or "soul."

For a comparatively short, as well as sound and all-round insight into this aspect of human functioning at the symbolic level, these lectures are to be cordially recommended.

Bostroem, A. DER AMYOSTATISCHE SYMPTOMENKOMPLEX. [Julius Springer.]

At the 1921 Brunswick meeting of the German Neurological Society the author presented a review of the clinical features of striatum disease as a supplement to the anatomical presentation by Pollak and the pathological substratum by Jakob. This monograph of 200 pages, constituting Vol. 33 of the Foerster-Wilmann's series, is an enlarged and reedited edition of this noteworthy contribution.

Strümpell invented the term, and outlined the complex syndrome in a somewhat formal manner. Bostroem does not follow him completely since he claims there is in reality no definite syndrome of the extrapyramidal functional pathology. There are many symptom pictures due to different localized anatomical lesions, only in the sense of a general disturbance of muscular tonus, of coördination of automatic movements, and of hindrance to pyramidal tract functioning can they be grouped as an abstract amyostatic syndrome in the sense of Strümpell.

Since dissimilar etiological processes may bring about closely related clinico-pathological syndromes, and since precise anatomical

localizations are yet wanting to permit definite differentiations, the difficulties in arriving at fundamental conceptions are very great. Yet in spite of all of these difficulties we may count this study of Bostroem as one of a triad of recent contributions to the physiology and pathology of the extrapyramidal systems of outstanding merit. Lewy's monograph on the *Bewegungsstörungen* and Jakob's large work on *Extrapyramidal Pathology* are the others. Now with Wilson's initial study, C. and O. Vogt's work on the striatum and these three recent issues of the same monograph series, the student of extrapyramidal disease is well equipped.

Bostroem's study is especially valuable from the clinical viewpoint and cannot be overlooked. It is both scholarly and judicial. We deem it of the highest quality of careful neurological work.

Lillie, Ralph S. PROTOPLASMIC ACTION AND NERVOUS ACTION.
[University of Chicago Press, Chicago, Ill.]

The preface of this stimulating work tells us it is based upon a series of lectures delivered at Clark University and the Marine Biological Laboratory on the physico-chemical basis of the more general or fundamental properties of living matter. Living, as differing from nonliving matter, shows the properties of specific growth, and an integration of activities securing life in the environment. Physiology is interested in the necessary physico-chemical constitution of matter which will permit these. The story of this synthesis is not easy to encompass, yet here is a masterly effort to accomplish it.

No review, without much detailed restatement of the author's pages, can show how this has been brought about. We shall therefore not attempt it; the book itself must be read. It is well worth it. We know of no better statement of the problems. What more can be said?

Franz, Shepherd Ivory. NERVOUS AND MENTAL RE-EDUCATION.
[The Macmillan Company, New York, 1923.]

The almost primer-like character of this book should make it of service far and wide. For the problem of nervous and mental re-education, especially since the World War, extends itself on every hand. It is necessary, furthermore, that the subject should be presented in a simple practical form so that the methods for its solution shall be readily available to patient and helper alike. This book is written in the spirit of open coöperation with the patient, of a direct comprehension of all phases of the situation in its physiological details and in its larger relation to the social position of the patient. A readjustment of this position is the end in view. There is clear outline of the basic facts on which efficient physiological activities are built up. The book forms therefore incidentally an unusually clear treatise on the simpler matters of physiological psychology, the foundation of habits, their formation when this is necessary, or the substitution of different reactions for those which have been lost. Franz speaks with the definiteness of an authority in a thoroughly

familiar field. His concise statements therefore suffer nothing in clearness as they are rapidly set forth. Various drawings frequently illustrate the mode of procedure and the device by which it may be carried out. Special chapters are devoted to especial neurological problems found in poliomyelitis, locomotor ataxia, cerebral paralysis and speech defects. The mental attitudes and adjustments from this point of view are noted in these situations while this side of the problem is more fully considered in a brief discussion of reëducation in the case of psychoses. This discussion pertains to mental disorders of all grades, from those consisting of only slight disturbance of relation to environment to those in which reëducation is impracticable if not absolutely impossible. The directions in the book are definitely applicable to specific problems. They provide at the same time the more variable background in which to meet any situation which may manifest itself in its own peculiar phases. As a guide to the public and to the special workers of our communities greater emphasis might well have been laid upon the many affective elements which are present in the patients as individuals or particularly as they manifest themselves in the situations in which the patients find themselves. The author in his own thought does not overlook this more complex psychological side. He has, however, taken it too much for granted, forgetting that workers need frequent specific reminders of it.

Dolonne, A. SELF-HEALING BY AUTOSUGGESTION. [E. P. Dutton and Company, New York, 1923.]

This book would hardly merit consideration were it not for the acceptance which its pretensions will find among many readers. Because of this it represents a psychological problem in itself. It agitates the oft-recurring question as to the unguided affective need of mankind which makes response to the meaningless repetition of phrase in terms of the author's exalted belief in his own words. Like "sounding brass and tinkling cymbal" are his reiterations of the blessings of autosuggestion and autoeducation. What these are in the terms of a psychology which actually investigates the human mind to discover its mode of activity, of this there is none. In fact Dolonne says that he does not believe in dissecting analysis. He asserts belief in the power of the idea but his belief is not based upon the examination of the content of the idea in all its varied significance to the individual under consideration. His attempt to clear autosuggestion of the mystery with which it has been surrounded goes just so far as to state that the sole material for autosuggestion is within the individual himself. Beyond that the writer has neither an insight into psychology nor a knowledge of neurology.

Chamberlin, Thomas Chrowder. THE ORIGIN OF THE EARTH. [The University of Chicago Press, Chicago.]

This small volume deserves something better than the accident of delay which has kept it from the reviewer's hands. It is one of that excellent series of scientific studies which bring vividly to the general

reader the practical results of specialized work. This investigation into the earliest history of the planet upon which we live is written with that enthusiasm which reveals an author and scientist genuinely interested in the subject of his pursuit. It reveals also the ground of his interest. First this is the importance of his subject. He is able to convince his reader that it is not a matter of mere academic speculations to understand the conflicting theories of how this earth came into existence and what has been the nature of its long adolescence. These theories and the clearer possibilities revealed by later research are the means of that knowledge of environment without pursuit of which the human spirit cannot be satisfied. Further, this knowledge forms the basis from which to investigate still more constructively the evolution which followed upon this planetary adolescence, the preparation of the surface of the earth for life and the appearance upon and within this surface of organic forms. Chamberlin finds here vital problems in the fields of biochemistry, organic syntheses, and most important of all, psychology. He only suggests the possibilities of research which open here but in this suggestion points out much of promise. In the same breadth of view he patiently submits to careful criticism the older theories of earth genesis based upon the gaseous hypothesis and as circumspectly unfolds the more probable theory of a dynamic stellar encounter by close approach as the origin of our planetary system. He traces the gradual formation of the earth about some nebulous knot resulting from this original cause, the center of factors playing about it, which also were set in motion by the initial occurrence and which aid in shaping the earth into lithosphere, hydrosphere and atmosphere. Thus the interaction of external and internal factors have preceded the final marvel, final thus far, "the emergence of what we call the living from the inorganic, and the emergence of what we call the psychic from the physiologic," which the author names "at once the transcendent and the transcendental features of the earth's evolution."

Holmes, S. J. A BIBLIOGRAPHY OF EUGENICS.. [University of California Press, Berkeley, California.]

The author or compiler is a professor of zoölogy in the University of California. Here are 500 pages of titles of all the available literature upon the subject of eugenics, direct and indirect. Heredity and Evolution, Genealogy, Degeneracy, Family Traits, Heredity of Human Defect, everything, almost anything, ever written bearing on possible and impossible modes, methods and notions and on improvement of the human race is made available.

It is a monument of industry and a work of reference of great value which will greatly facilitate further research on this most important branch of humanism.

In the spirit of "malicious malevolence" we suggest that the Rockefeller Foundation present a copy to each member of the United States Senate and a specially embossed copy to William Jennings Bryan with the police regulation that they, and particularly

he, be compelled at least to cut its pages. Perhaps in this moronic occupation they, of the Senate, and he, may get a fruitful idea.

Schmidt, Vera. PSYCHOANALYTISCHE ERZIEHUNG IN SOVIETRUSSLAND. [Internationaler Psychoanalytischer Verlag.]

If the reviewer had not had at least five years' experience in an effort to apply psychoanalytic principles to polyclinic material, and an intimate touch for ten years with groups of idealistic educators in primary schools with similar aims, this small brochure might have been considered quite a "new thing." As a matter of fact there is at the same time much and little real value in the program here outlined. Honest and intelligent people, chiefly educators, have been applying these principles in the United States for a number of years, chiefly stimulated by Stanley Hall, and we find little new or startling in the author's suggestions, as applied to soviet Russia. Nevertheless, the brochure is of value as a *record* of an effort to bring Russia to a realization of certain social values which in the United States might be said to be "common sense" in education.

Varendonck, J. THE EVOLUTION OF THE CONSCIOUS FACULTIES. [The Macmillan Company, New York.]

This author has previously given us a really valuable book on the Pathology of Day Dreams. The present fascinating volume develops the theses therein outlined and lays emphasis upon the importance of unconscious processes which have been grossly neglected in the centuries-old discussions of psychology. In fact the teachings of scholastic psychology are shown to be but ephemeral snapshots of deeper situations, and are largely subjective colorings of group prejudices. We might call them unconscious propaganda of social attitudes. In the words of the Quaker's statement, to his wife, "all the world is queer save me and thee, and thee is somewhat queer." So "Modern Psychology" appears but a series of scholastic absolutisms—rationalizations, we might insultingly suggest, born of the acquisitive instinct to sell "my book" to "my students" in order to pass "my examinations" in Courses A-1 or B-3, or what not.

These latter remarks are the reviewer's "glosses"; they are not the author's notions, for he goes directly to his knitting and very penetratingly discusses a host of phenomena of everyday occurrence which are not explained by the schoolman, who too much neglects the affective elements in all thinking.

It may be surmised that the "depth psychology" of Freud has entered into this author's attitude of mind and fortunately so, for here we have a discussion of the genesis and value of "consciousness" of extreme importance.

Morgan, C. Lloyd. EMERGENT EVOLUTION. [Henry Holt and Company, New York; Williams and Norgate, London.]

Lloyd Morgan's work, possibly because of his Canadian residence, attracted much attention from neurological students. His behavioristic attitudes have always rendered what he writes of special interest. The present Gifford Lectures are no exception to this.

Evolution is particularized here by him Emergent, utilizing a term of George Henry Lewes. It is an intriguing connotation even if there should possibly be a tinge of preformation about the name even if absent in his discussion, for it is with the new coming out of the past that he concerns himself. This emergence is unpredictable and he would attempt to get some vision of the mechanism, call it Nature, Force, Elan, or God. The last is his preference. Divine Activity its "ism." It has no distinction of entities.

Alexander's "Space-Time" conception is largely leaned upon and efforts made to put it into a more biological setting.

Atoms and atomicity, molecules and molecularity, inorganic forms, these make up the base of Morgan's pyramid; organic vital relationships come higher up in the scheme and mentality crowns the apex. This pyramidal concept, quite understandable in neurological terminology as Hughlings Jackson's level hypothesis, is very neatly stated in the two opening lectures, and the philosophical connotations elaborated.

Mentality is not adequately dealt with to our minds, since only conscious mentality seems to have cognizance. The behaviorist's pattern is presented but the stimuli producing the pattern quite inadequately grasped and elucidated. Even though the optic receptor apparatus is recognized of great value in evolution Morgan's treatment of the various receptor mechanisms is quite open to severe criticism. Proficiency through vision is well recognized but it is not the only proficiency. There is a whole world of vital receptor patterns lying below the gnostic patterns, from which much of emergent evolution arises through mobilization of foreconscious processes concerning which Morgan's discussion is too negligent. His reference to paradoxical reactions (p. 54) is simply faulty neurobiology. Had he known more of the trigeminus he would not have leaned so heavily upon the relatively late arriving optic capacities in the animal phylum.

His chapter on Memory we believe would have been better had he not taken Russell at second hand and gone to Semon's remarkable studies. Reality would not have been quite so difficult to present if engram pattern reactions had been better comprehended, and vision and contact not relegated above other contacts of less gnostic but greater vital (protopathic-visceral) significance. Sherrington's ideas are quite sound, but they do not contain all of the truth and Morgan has neglected the proprioceptors quite shamefully.

The discussion on Relativity is very intriguing but for the neuropsychiatrist quite unconvincing. The "Unconscious," in the widest Freudian sense, contains the truest Einsteinian correlates without a comprehension of which causality of mental activities is, for us, as Morgan has developed it, quite senseless. Although the author in his Preface has spoken of Huxley's hints, relative to Neurosis and Psychosis—Morgan's thesis leaves these phenomena unilluminated, he really has not extricated himself from the scholastic dilemma of Mivart, hence he remains futile, and has no better subsumption than Divine Activity.

Vorberg, G. JEAN-JACQUES ROUSSEAU, LORD BYRON, KARL STAUFFER. [Otto Gmelin, Munich.]

This quarto pathobiographical analysis of Rousseau, Byron and Stauffer is a carefully conceived and well executed work, even if dealing with problems on the conscious level. It is not large but for students of genius variants it will be of much interest.

All three of these artists, for as such must they be conceived, show marked conflicts with their environmental situations. Their lives are sketched in broad outline with the usual emphasis upon the neurotic-psychotic coloring. Concerning Rousseau he comes to no special classification although discussing briefly Möbius', Kretschmer's, and Stekel's opinions. He states he does not understand what Stekel is talking about. That he had hallucinations of hearing he believes probable, but he is not aware of their significance.

Byron's life is sketched in much the same manner and shows many similar traits to those of Rousseau. They both were children of nature and suffered from their conflicts with the herd groupings. To attempt to label them in terms of descriptive psychiatry is stupid—the author is not too keen to attempt it.

Stauffer was a well known Swiss painter, etcher, sculptor and poet. He, too, was a genius. He took an overdose of chloral for insomnia and died. He also had suffered from cyclothymic episodes, his father having had manic-depressive attacks.

A series of letters of Jane Clairmont written to Byron are included in this interesting monograph.

Hochstetter, F. DIE ENTWICKELUNG DES HIRNANHANGES. [R. Deuticke, Vienna.]

In an earlier "Beitrag" to the developmental history of the human brain Hochstetter, on the basis of about 100 human embryos, gave us a careful description of the pineal body. This second contribution deals with the hypophysis. We do not intend reviewing it from the embryological point of view since so few of our readers are deeply versed in this field. Because of the clinical interest in these structures and because the ontogenetic point of view is of value in determining structural affiliations and hence casting light upon functional activities we recommend this careful piece of work to all who would go deeper into the problems.

Tilney's careful embryological study of the Hypophysis is recent and its considerations supplemented by this excellent monograph.

Handbook for Mental Nurses. [Handbook for Attendants on the Insane.] Seventh Edition. Published under the Authority of the Medico-Psychological Association. [Chicago Medical Book Company, Chicago.]

The new title of this book is a sign of its up-to-date character. The book presents in its new edition the fundamental facts of nervous and mental disease and outlines the character and attitude of approach which best equip the nurse for his or her peculiar task with the mentally sick. Furthermore, the even more fundamental facts

of the nature of mental disturbances of psychogenic origin or of the patient's mental manifestations even in organic psychoses have been set forth lucidly for the nurse's consideration. It is gratifying in a work of the nature and aim of this one to find the unquestioned acceptance of the value, one might say of the indispensableness, of the psychoanalytic approach for an actual understanding of mental disturbance. The portion dealing directly with psychogenic causes is a clear presentation in simple form of the cardinal principles of psychoanalysis as they represent the findings in regard to the sources and mechanisms of mental disturbances. This portion has been written chiefly as these findings pertain to the psychoneuroses. Yet it has not been left unnoted that the understanding which these findings give of the conflicts of the patient is applicable also to the psychoses. More emphasis might have been laid upon this so that the nurse might be more convinced that in either case he has to do with the same fundamental situation. A lack of this emphasis is felt for example in the section on insomnia. Nevertheless, if the reader reads the whole book carefully he himself will make the application of the dynamic point of view. For this is the view upheld by the writers of the book, the view that no condition is a merely static one but the expression, in part at least, of factors actually operative below the patient's consciousness.

Cajal, S. Ramon y. LIBRO EN HONOR DE. [Madrid.]

The many students, friends, and admirers of Cajal have here presented him a "Festschrift" in the manner of similar volumes frequently prepared in German science. J. F. Tello has been the active editor and has been assisted by other Madrid colleagues.

The present honorary volumes are two in number, presenting twenty-five papers in the first and thirty-three in the second. The contributors are internationally known. Lenhossek, Pedro Cajal, Schaffer, Mott, Tanzi, Sherrington, Dustin, Boeke, Rossi, Herrick, Tello, Lugaro, Kappers, Hortega, Marinesco, Babes, Sanchez, Holmgren, Havet, Bielschowsky and Henneberg, Castro, Fañanos, Pettaluga and Villaverde—have written in their respective fields for the first volume. All of these studies are of the highest rank and most are original. Boeke discusses the vegetative innervation of the muscle in reptilia; C. J. Herrick gives a masterly paper on the Functional Factors in the Morphology of the Forebrain of Fishes, and Kappers' study on Neurobiotaxis as illustrated in the Optic Nerve is a singularly lucid demonstration of this principle to the elucidation of which Kappers has devoted so much careful consideration. Holmgren's study on the Organ of Taste is noteworthy, as also Bielschowsky and Henneberg's study of Central Neurofibromatosis. These are but a few of the articles in this first volume.

In the second, Nageotte, Nô, Bethé, on Regeneration of Nerves; Bordás, Athas, Marie, on Thalamic Sensory Disturbances; Nonidez, v. Monakow, on Choroid Plexus Alterations in Dementia Precox; Asúa, Costa, Lafora, on Experimental Athetosis; C. and O. Vogt, on Pathoarchitectonic u. psychotische Erkrankungen; Maraño, on

Adrenalin and Emotivity; Veratti, Suñer, Prenant, Ortín, Lacassagne, Fernandez, Buen, Jacob, Turró, Houssay and Lewis, on the Suprarenal; Murillo, Jacques Loeb, Rocasolano, Kraus, Garmendía, Schiefferdecker, Pacheco, Mowriz and Negrin—these are the contributors, with some of the titles to this volume.

It is a volume worthy of its stimulus.

Taylor, R. Tunstall. SURGERY OF THE SPINE AND EXTREMITIES. [P. Blakiston's Son & Co., Philadelphia.]

The author of this book has proceeded to his task in a very direct manner. He has written for medical attendants and students, internes and nurses, for all who have a part in the important corrective and reconstructive work of bone and joint surgery. He has prepared a manual of practical information for their aid. He gives a brief definition of orthopedic surgery and its place in the larger field of surgical medicine. He reviews the history of this branch of service through the preceding centuries and refers briefly to the opportunities for its development which recent times have brought. He then proceeds to the presentation of the technical application of orthopedic treatment through the various devices at the surgeon's disposal, describing the use of these individually. He gives also a short discussion upon the pathogenesis of deformity. The greater part of the book is devoted to disorders of the spine and of the extremities with chapters also upon infantile paralysis and other diseases of childhood and adulthood. In all the presentation is that of one with the authority of practical experience whose aim is the most concise and effective attack upon the definite problems in hand. Etiology and pathology are ever present in the writer's consideration as he views the entire subject of the nature and treatment of these disorders as a broad functional problem. The many illustrations support and supplement the clearness of the text.

Van der Hoop, J. H. CHARACTER AND THE UNCONSCIOUS. Authorized Translation by Elizabeth Trevelyan. [Harcourt, Brace and Company, New York.]

This interesting, well written and also well translated book is another addition to the International Library of Psychology, Philosophy and Scientific Method. Its chief aim is to set forth a critical exposition of the psychology of Freud and of Jung.

As a most readable summary of the more general features of the psychoanalytic standpoint it is to be highly commended. It is easy and pleasant reading—not as intricate as the subject matter really demands for scientific presentation, yet so far above the usual popular modes of exposition as to deserve special mention.

In one respect the reviewer finds its rather banal insistence on differences in "normal" and "abnormal" too stupid for patience and scholastic to a degree as to make one doubt if a true comprehension of the Freudian dynamic attitude is possible. The synthetic aspect emphasized by Jung is stressed, we think, unduly. Certainly one hardly needs to be told that when a spring is released it will travel in the direction of its fixed point. While one does not doubt

the "prospective" function of much "phantasy material," it is really of little avail until "fixation" points are reached, to let the spring go. We cannot see that the author has really made Jung's position any the more tenable, although it may be conceded that in actual psycho-analytic practice one "may temper the wind to the shorn lamb" and get results which a more rigid discipline may not accomplish. At all events the book is welcome as a sincere and intelligent effort.

Kretschmer, Ernst. ÜBER HYSTERIE. [Georg Thieme, Leipzig.]

Kretschmer's volume on hysteria justifies its appearance within a literature already large in this much discussed field. He has not multiplied the description of manifold symptoms but rather given consideration to the inner nature of the hysterical reaction and the mechanisms by which this finds expression in its many forms. His mention of the external manifestations has been in each instance the pertinent illustration of these underlying mechanisms and of the purpose striving behind them.

He begins by defining hysteria in terms already expressed, that it is an abnormal reaction to the demands of life, an abnormal psychic reaction, he would add. He points out a certain nucleus to its symptom groups, found in convulsive attacks, stuporous forms and twilight states, tremors and tic-like twitchings, paralyses, muscle tensions, sensory disturbances, which distinguishes it from other psychogenic manifestations. His view is sufficiently penetrating to recognize that the biological point of view of hysteria or the purposeful one are at bottom the same. The wish is present which then makes use of phylogenetic reflex and vegetative mechanisms to carry out the hidden purpose. These forms of reaction may be grouped comprehensively as those of motor storm [Bewegungssturm] and the assuming of the death reaction [Totstellreflex]. Either form expresses a defense against reality or an escape from it. In the elaboration of the psychic attitude, as he shows in his later discussion, the defense may go so far as to build up a compensatory form of action as a substitute for the feared and rejected reality. He prefers to define the hysteria as a yielding to the instinctive reaction as opposed to the rational instead of laying stress upon the distinction between conscious and unconscious choice. Yet in his discussion of the place of the will he recognizes the different nature of the will which opposes the reasonable course, defining it therefore much as the study of the unconscious has revealed it. He acknowledges the importance of fear and erotic impulses in the causation of hysteria but does not give to sex the broad application which Freud has given it. This appears to be the ground of his partial rejection of the unconscious factors as the latter has defined them. In appreciation of the dynamic wish background and of the mechanisms through which it finds action Kretschmer's point of view follows the same general principles. He discusses in much detail the method by which the fundamental nervous mechanisms are enlisted in the service of the hysterical purpose to become fixed in pathological form. He believes that there is a period when there is a slight

voluntary strengthening of a tremor or other symptom that may have arisen and that this voluntary participation is soon veiled from consciousness so that, aided by repression, the situation becomes "objectified" for the patient and so continues to exist apparently beyond his control. Beside his simple and comprehensive statements of the nature and mechanism of hysteria Kretschmer has cleared certain points from obscurity. He shows for example how little force "suggestion" in its commonly understood sense has in hysteria and yet what its actual place is. The book in its small, convenient form contains much illuminating matter.

Castaldi, Pighini, Cerletti, Rossi, Lugaro. FUNZIONI E DISFUNZIONI TIROIDEE. [Dell' Istituto Sieroterapico Milanese.]

The Serotherapeutic Institute of Milan at its third annual conference invited the various scientists here represented to discuss the problems of the functional activities of the thyroid gland.

This small brochure of 300 pages records this conference. Luigi Castaldi of the Anatomical Institute of Florence discusses the "Influence of the Thyroid upon Bodily Growth." G. Pighini of the Psychiatric Institute of S. Lazzaro contributes a paper on "Endemic Goiter and Its Etiology." Cerletti of the Neurobiological Institute of Milan writes on "Endemic Cretinism," richly illustrated. Rossi, professor at Sassari, on "Thyroid Dysfunction," a very scholarly and complete exposition which makes up the major portion of the volume.

Lugaro, Professor of Psychiatry at Turin, writes on the "Psychical Repercussions of the Thyroid Function." This terminates the volume.

While there is little new or original in this work, nevertheless it presents an excellent résumé of existing states of knowledge concerning thyroid physiology and pathology.

Ogden, Robert M. HEARING. [Harcourt, Brace & Company, New York.]

In his Preface the author tells us of his early interest in the problem of hearing, his reviews in the *Psychological Bulletin*, and finally of his resolve after some ten years collecting to bring it all together in a book, the present offering. He starts with the physical waves, and with various complex combinations; he then discusses the receptor apparatus, the ear, and the cochlea, approaching which he makes the extraordinarily foolish remark: "It is not certain that the vestibule and semi-circular canals are sense organs." Such stupidity almost prompts us to shut the book and go to our next. We recommend the author's reading Winkler's discussion of the Auditory System in his "Manuel de Neurologie." The discussion of the organ of Corti is quite rudimentary. Although Marburg's "Handbuch der Neurologies des Ohres" appeared after this work the data therein contained was for the most part available. From here on the author takes up a variety of technical problems of tone, pitch and other things which, while of much importance, are not

correlated with the brain mechanisms in any way. We find no discussion of symbols, of symbolic values, of symbol formation and a host of things of intense interest in "hearing."

On the whole a pure "psychological" product of much artificial word making and not a real contribution to the large problem of hearing. We are convinced the Hechscher Foundation could spend its money to better service than in getting out this "dud."

Schilder, Paul. DAS KÖRPERSHEMA. [Julius Springer, Berlin.]

Schilder is an intriguing figure in modern neuropsychiatry. As first assistant in the psychiatric clinic of W. v. Jauregg in Vienna he has a noble array of more than usually interesting contributions, large and small, to his credit. This is among his minor contributions. It would deal with a much neglected theme, the "Consciousness of One's Own Body." Not that the older "Almanac" replicas did not frequently recur to this topic, but in really scientific circles, bodily consciousness was too much taken for granted and really neglected.

Pick of Prague, recently deceased, as representing in European neuropsychiatry one of the most talented and charming of contemporaneous figures, has frequently emphasized the values of structural neuropathology for the psychiatric domain. Structure and function have a tendency to be divorced when dealt with by the young and enthusiastic, but, as in the case of Pick and his disciples, they are one and indissoluble. Meynert, Wernicke, Liepmann, yes, should one leave the strict limits of Schilder's frame and include "Heraclitus"—"the Organism as a Whole" is constantly in need of emphasis of medical science, is really going to be in a position to envisage its variations, somatic or psychological.

In general, Schilder would deal with those considerations which tend to build the body into a unity, and in pathological detail with anything which interferes with such an integrity. The disintegrating processes which interfere with the "Körperschema"—these are his concern.

No review can really subsume this small but at the same time important study. We recommend it to our readers.

Oropesa, Manuel Guevara. PSICOANALISIS. [Imprenta Victoria, Mexico.]

Oropesa makes a brief study of psychoanalysis as a method of much importance in comparison with other methods for understanding and reaching mental disorders. Such is his testimony in his constant use of the principles of psychoanalysis in viewing the mental phenomena which he has discussed. They are treated in the light of research and interpretation on the part of the various modern schools of psychotherapy. He gives here open testimony to the findings and the theories of Freud and his followers but always with frankly acknowledged reservation on his part. He criticizes the theories and objects to the unsubstantiated claims, as he believes, which psychoanalysis makes. He summarizes his conclusion concerning psychoanalysis by stating that "it is not a new science, nor a revolutionary

psychology, nor a panacea in mental disorders." He has more enthusiasm, we notice, for those like Jung who do not follow Freud fully but deviate from the latter's development of theories. Freud's "pansexuality" is a stumbling block to the author together with the absurd lengths, as he sees them, to which the pressing of so arbitrary a point must lead. Oporesa's bibliography shows a fairly varied range of psychoanalytic authors but not a very extensive study of Freud's continued writings. Here he would have found that most of the objections felt by him have been made the subject of keen criticism and constant revision on the part of the author of psychoanalysis. Oporesa fails to realize the true significance of Freud's broad conception of sex. If it has any truth then it is not a dogmatic theory into which everything must be made to fit. It is rather a statement of an inescapable fact, the presence of an underlying instinct infusing itself through life's manifestations. No one is submitting this idea also to more persistent critical investigation than Freud himself. Thus psychoanalysis is a truer science than the writer would have us believe, at least in its spirit of never ceasing investigation of its own tenets. The body of the type of interest which psychoanalysis is assumed to arouse in lustful minds is of the writer's own conjuring. It is strange that one who can so well review the subject of mental disorder with the modern methods of understanding it can concur in such an overheated misrepresentation as that which he has quoted. This concerns the morbid ferment which psychoanalysis is supposed to have aroused in the minds of the women of the United States.

Rivers, W. H. R. *CONFLICT AND DREAM.* With a Preface by G. Elliot Smith. [Harcourt, Brace and Company, New York.]

Rivers himself has partly anticipated the criticisms which arise in the mind upon reading his book. His theory of dreams and psycho-neuroses together with his interpretations of dreams are not "almost" but quite "too good to be true." His manner of reading Freud and then restating what he conceives to be the latter's attitude certainly gives us "too crude and simple a state of the case." His consideration of the dream problem is a superficial one. He shows enough sympathetic conception of the importance of the dream and of its nature here and there to expound Freud's point of view with a certain, clear instructiveness. For the greater part, however, he is incapable of entering into the deeper phases of the problem. "Incapable" is not a word with which for a moment we would impugn Rivers' intellectual acumen or his knowledge of much of the world's lore. Yet intellectual acumen is easily blunted when it comes up against the material which experience, guided by psychoanalytic research, has convinced many lies beneath the mere surface of dreams. And knowledge of the world's lore even may become misleading when the blunted tool has slipped back over the mere surface of things.

Rivers' lack of penetration, resulting in a formally stated rejection of much of Freud's teaching, is made evident by his setting up of numerous straw images imputed to Freud or perhaps only to his

followers and then attempting destruction of these. Or it is evident in the misinterpretation which permits the upholding of a half truth where Freud has carried the matter into eloquent depths. Let us take Rivers' main thesis, for example. Has Freud denied that the dream is an attempt at the solution of conflict, but he finds this conflict permeating the patient's life in the deepest depths and in the most complex forms. This does not exclude the presence of some more recent temporary situation in the individual's life but it finds beneath that much more. Here, too, Rivers shows a misconception of wish-fulfilment as if but one wish were to be considered and not a contradiction of wishes, the existence of which convinces one of a deeper realm of dream creation. The matter certainly is not dismissed by assuming a distinction between wish and desire. Rivers' idea of sex is too crudely narrow to offer comparison with the concept which Freud has so richly developed. Symbolization, too, is so dogmatically conceived, as Rivers finds it in Freud, that the former stands accused of the arbitrariness he imputes to the latter. Freud has shown how categorically symbolisms return from the unconscious of man yet has he not most explicitly stated that the symbol must be rediscovered and reinterpreted according to each individual's use of it? The instances multiply themselves in which Rivers has only criticized faults which do not exist and has emphasized as his own discoveries and contributions where he is merely restating what Freud has established so much more convincingly. Mistakes there have been and will be in psychoanalysis, discoveries are ceaselessly contributed by it to the world's thought. Both these are pursued by Freud and his fellow workers with a scientific humility and a relentless penetration which this critic for one has not made his own. Rivers has turned from this deeper pursuit of the very points that he has raised just as he has failed really to analyze a single dream which he has presented.

Schilder, Paul. SEELE UND LEBEN. [Julius Springer, Berlin.]

This fascinating monograph (No. 35 of the Foerster-Wilmanns series) deals with fundamental considerations of the psychology of schizophrenia and paraphrenia, of psychoanalysis, and of psychology in general.

After a short introduction on aim and method, and on phenomenology and psychoanalysis, Schilder takes us into a consideration of Conceptions—partly founded upon Gomperz' *Weltanschauung*. He would argue for the affect aim of conceptions, as biologically founded developments from the instinctive life. He then gives five case histories to illustrate the method of conceiving what is going on behind the complicated hallucinatory, delusional reacting behavior.

This leads to a discussion of the relations of the personal Body and the external World, also illustrated by case histories with a carefully woven utilization of the newer psychoanalytically gained insight into the mechanisms.

Chapter III deals with "Ethos und Neurose," a most fascinating chapter, in which one can see that the human inheritance has built up an ethical ideal (a concept quite analogous to Freud's Ego ideal, or

the philosopher's "Ethical Imperative," or the theologian's idea of God and "Sin"). Schilder's outline is essentially biological and penetrating and shows some slight variation from a too formal statement of the Freudian position, which position the reviewer does not interpret in the narrower dogmatism, which critics less informed than Schilder are too prone to emphasize. Schilder intones the dual aspects of the libido and interest drives and quite penetratingly shows their interactionism. As some, who, speaking of certain trends in the development of psychoanalysis in America, speak of it as a "school," have insisted on the "ethical" motivation as essential in human biology, whether seen behind "religions" or other type of phenomena, so Schilder's interpretations in this chapter are sympathetically appreciated. Freud's essential position is here so understood, although we feel some of his satellites are not in the orbit and have unwittingly and prematurely disparaged many American workers who have grasped this situation with perhaps less sadistic inclinations for absolutism. Schilder's few lines apropos of Groddek's position we feel are not comprehending, for American work with tuberculosis and other organic disease, is being recognized by those nearest to the center of Freud's influence, even though independently arrived at and antedating Groddek's work; *i.e.*, White, Kempf, Clark, Jelliffe, *et al.*

Chapter IV on Schizophrenia is excellent even if Kempf's important contributions, some of the most important in the entire literature of schizophrenia, have been overlooked.

Chapter V on Psychoanalysis, with illustrative material on the Œdipus Complex, Homosexuality, the Castration Complex, Eye Eroticism, Anal and Urethral Eroticism, Sadism and Masochism, with a general discussion of Affective Mechanisms, is well worth while. Schilder's comment on Stärcke's notion that one cannot be psychotic on a desert island—originally an idea from Heraclitus—is certainly one-sided—Freud himself in his generalization that the "psychosis" is a manifestation of a conflict between the "Ich" and the "environment" is certainly truer to the Heraclitian discussion, supporting Stärcke rather than Schilder. Much water must run under the bridge before the relation of sociotropic adjustments to the individual will be solved in the light of psychoanalysis.

This work is a definite contribution and is heartily recommended to our readers.

Hollos, Stefan, u. Ferenczi, S. ZUR PSYCHOANALYSE DER PARALYTISCHEN GEISTESSTÖRUNGEN. [Internationaler Psychoanalytischer Verlag, Leipzig, Wien, Zurich.]

For a number of years it has seemed to the reviewer as undoubtedly to many another, that Descriptive Medicine had become sterile. While not unappreciative, and to a very great degree, of the enormous expansion of all medical concepts which came through the genius of Virchow's Cellular Pathology formulations, something more was

needed than a Pure Pathology—extraordinarily rich as it undoubtedly has become and is capable still of developing.

The Constitutional Pathology which has grown out of cellular pathology is an evidence of this evolution. Although driving deeper into Mendelian factors of heredity, into underlying physico-chemical organizations of living protoplasm, and still further into the integrative possibilities of the nervous system in making the conception of the "Body as a Whole" a relevant synthesis for an "Individual Pathology"—this constitutional pathology also will be inadequate, if that greatest of all syntheses in the evolution of the animal phylum seen in man, the Psyche, be neglected as a part and parcel of the general chain of causality. No CONSTITUTION as such is a valid conception without including the part played in it by that series of phenomena broadly termed the "Soul."

Here is a unique undertaking: namely, an effort to see the mental symptoms in a well recognized somatic disorder, involving all the tissues of the body, and notoriously the brain structures, from the standpoint of the integration of the human personality, *i.e.*, those factors often spoken of as the "Soul." The personality disintegration is studied in long section as it were and correlated with the findings of the psychoanalytic technique thus giving an entirely new understanding of the whole mental picture in general paresis and incidentally throwing much light on the developmental nature of human personality, and the resistances put up by the *Ego* to the disintegrating factors of an organic pathology.

No more fascinating nor intriguing study has been attempted than in this effort at obtaining a better insight into the phenomenology of the mental picture of general paresis. The bizarre disarray which descriptive psychiatry has given us is most ingeniously rearranged and order is seen in the apparent chaos of that most "organic" of the psychoses.

Spitzer. ANATOMIE U. PHYSIOLOGIE DER ZENTRALEN BAHNEN DES VESTIBULARIS. [Arbeit Neur. Inst., 25, 1924, 423.]

In this thorough discussion Spitzer first outlines three stages of synaptic junctions of the vestibular stimuli

(1) Oblongata synapses: Lateral and Median Nuclei.

(1) Lateral Group (3) in number.

(a) Oral and dorsal: Bechterew: Nucleus vestibularis angularis; (b) Medial: Deiter's. Nucleus vestibularis magnocellularis; (3) Cardial and ventral: Rollers. Nucleus vestibularis descendens.

(2) Median Group:

(a) Nucleus triangularis (N. vestibularis parvocentralis).

(2) Cerebellar nuclear synapses. Paleocerebellum.

(a) Nucleus tecti or fastigii; (b) Nucleus globosus; (c) Nucleus emboliformus.

(3) Cerebellar cortical synapses. Paleocerebellar.

(a) Vermis: Anterior in Lingula, posterior in Uvula and Nodulus; (b) Hemispheres: Flocculus.

The stimuli are distributed to these nuclei through a descending and an ascending branch. The descending branch, *radix descendens vestibularis*, terminates in the triangular and Roller nuclei, as well as in Deiters' nucleus. The *radix vestibularis ascendens*, sends collaterals to (a) the triangular, Deiters' and Bechterew's nuclei and (b) a set that go to the cerebellar nuclei and cerebellar cortex.

All three levels are at the same time centers for reflex activities of the centripetal stimuli of the vestibularis. Other centripetal stimuli also enter these nuclei and constitute other reflex arc systems.

(A) Only vestibular root fibers enter the oblongata nuclei. These are therefore primary and constitute pure reflex centers of the vestibular.

(B) To the cerebellar root and stations secondary fibers are received.

(1) The cerebellar stations receive vestibular fibers from the primary oblongata synapses and also fibers from the vestibular roots. They thus are mixed—primary and secondary reflex centers of the vestibularis.

(2) Spinocerebellar and bulbocerebellar central paths, originating from the cells of Clarke's columns, and the nuclei of Goll and Burdach, conveying movement stimuli from the trunk and extremities to the cerebellum as the vestibular does for similar stimuli of the head region.

(a) The cerebellar nuclei therefore become complex coördinating synergizing (*assimilatorisch synthetisch*) reflex centers of the vestibular, as the oblongata centers are primary reflex centers.

(b) Vestibular, spino and bulbar cerebellar pathways end in the cerebellar cortex also, where the centers are separated. The vestibularis centers form an external basal ring-like zone for the kinesthetic stimuli of the head. The centers of the spinocerebellar tracts a more internally and higher lying ring zone for the homologous stimuli of the neck and body; the innermost upper zone take the homologous stimuli from the extremities, *i.e.*, posterior column stimuli. These zones are all supplied with association fibers. A synthesis of vestibular with other related stimuli takes place here. It is an association area. These cortical centers are also complex synthetic but they make a higher associative synthetic hierarchy of the nuclear cerebellar centers.

The centrifugal branches of the vestibular reflex arc system are divided into 3—(1) cerebellar cortical: cerebellar nuclear and oblongata motor components. The cerebellar cortical branches are not united in a bundle. They come from all parts of the cerebellar cortex to the central cerebellar nuclei. The nuclear cerebellar motor system is built up of two (1) a conjunctival (2) juxtarestiform main systems. The conjunctival system—*tractus cerebello rubralis* connects the *n. emboliformis* and *n. globosus* by means of the (*binde-arm*) *brachium conjunctivum* with the crossed nucleus ruber, its large cell portion. The juxtarestiform system—(a) *tractus uncinatus*, (b) *tractus entoconjunctivalis*; (a) connects the cerebellar nuclei, principally *n. tecti* with the crossed oblongata labyrinthine nuclei,

especially n. Deiters and (b) connects the cerebellar nuclei, chiefly embolus and globosus with the homolateral oblongata labyrinthine nuclei, chiefly n. Deiters.

The oblongata motor system is made up of three bundles. (1) Tractus rubrospinalis connects the large cells of the nucleus ruber with the crossed anterior horn cells of the spinal cord through its entire length. (2) Tractus vestibulospinalis, from Deiters' and Roller's nuclei goes ventrolateral mostly crossed to the extremity muscles. (3) Tractus vestibulo-longitudinalis, a part of the posterior longitudinal bundle. Originates from three nuclei of the lateral columns of the vestibularis and runs up and down in the posterior longitudinal bundle. The n. Bechterew supplies the n. Deiters' descending Roller's nucleus both. Both crossed and uncrossed fibers enter the posterior longitudinal bundle. The ascending branches end in the eye muscle nerves, the descending branches in the cervical horn cells. In mammals, thus, the eye, neck and head muscles are integrated. Throughout these motor systems a rich collection aberrant fibers is found binding the various bundles. Spitzer draws from this the general deduction that this entire system has a phyletic compounding relationship that originally constituted a more or less single diffuse pathway, a tractus cerebello-tegmento-spinalis, from which the later tracts have evolved with the increasing complexity of the receptor organs in the advancing animal phylum.

The function of the different vestibular and cerebello-vestibular reflex arcs may be summarized as follows: (A) The centripetal paths conduct different kinesthetic stimuli to the three overlying level reflex centers. (B) In the oblongata reflex centers the pure vestibular stimuli are reflected to the motor paths. The heterogeneous kinesthetic stimuli are assimilated in the cerebellar nuclei; they are associated in the cerebellar cortex. (C) the morphological unity of the motor paths mirrors their functional unity in that they are influenced by homologous kinesthetic stimuli and are carried to homologous anterior horn cells. (1) The upper cortical-cerebellar level of the motor system serves for the superposition of the associated and assimilated synthesis of the kinesthetic impulses. (2) The medial nuclear-cerebellar level carries the cerebellar synthetic impulses by means of (a) the conjunctival bundle from the large red nucleus cells where cerebellar and cerebral impulses are balanced, (b) by means of the juxtarestiform paths and the pure vestibular nuclei, (3) the lower oblongata level carries (a) the rubrospinal tract, (b) the vestibulospinal tract, and (c) the vestibulo-longitudinal tract.

The rubrospinal tract, as Magnus has shown is the motor path for the "position reflexes." These reflexes are released through the combined activities of the labyrinthine reflexes of the head and the deep and superficial sensory stimuli of the trunk and extremities. The "position reflexes" are synthesized in the cerebellum and travel by way of the superior cerebellar peduncles to the red nucleus. The vestibulospinal tract serves for the function of locomotion. The vestibulo-longitudinal tract functions for the clinically interesting

labyrinthine reflexes of the muscles of the eyes and head. Ocular nystagmus is a functional reflection of this connection. Both the long and short components are related to the labyrinthine nuclei as first shown by Marburg and further verified by Kleijn. The complicated factors of nystagmus are exhaustively analyzed and intricately illustrated. Spitzer's schema is as follows: (a) for horizontal nystagmus there are two paired pathways. In the pathways from Roller's nucleus the crossed fibers are in the majority, in those from Bechterew's paired pathway the uncrossed fibers. In rotatory nystagmus the movement is determined on the side of the labyrinthine stimulus. For the determination of ocular deviation the path of the long component must be followed. The eye deviates to the nonstimulated side. In labyrinth destruction the same symptoms follow but in an inverse direction but more strikingly demonstrated.

Why there results no nystagmus but rather muscular contractions from the trunk and extremity stimuli is a very deep and complex problem which Spitzer touches upon but promises to discuss later. The balance of bodily movements, anatomically as well as functionally analyzable, is a function of this labyrinthine synthesis. The eyes as well as the spinal musculature are *axial organs* functionally considered. The limbs are *appendicular*; their movements fundamentally belong to segmental systems and are governed by the general laws of the labyrinthine system. The posterior longitudinal bundle is the bundle of this axial system, the vestibulospinal tract being an emancipated partial tract to permit of greater assymetry in bodily movement.

Spitzer states that the cerebellum is not an inhibitory organ, it functions only positively. Oudianomie—i.e., synergy, is its function of which balance is one of its outward aspects.

Sherrington's decerebrate rigidity is thus a labyrinthine rigidity. Bechterew early described a commissural connection of his nuclei, section of which abrogates the action of both labyrinths, and thus causes a decerebrate rigidity. Spitzer claims that the Magnus-Rademacher's experiment does not reveal a lesion of the rubrospinal tract but rather a cutting of this commissural function, which will show as a decerebrate rigidity. It is really an interlabyrinthine nuclear disturbance.

Spitzer now passes to a consideration of the vestibular sensory pathways. Where or how do they pass to the cerebral cortex? He thinks it probable that the different movement stimuli pass by way of the cerebellum, are there unified, and then by way of the superior cerebellar peduncle pass to the small cells of the red nucleus and then to the ventral nucleus of the thalamus (Vogt) and finally reach the cortex.

In his highly complicated diagram (3) Spitzer essays an analysis of some of the functions of the posterior longitudinal bundle, one of the phyletically oldest and most complicated structures of the central nervous system. It contains not only vestibular reflex arc systems but many others of which the optic systems are the most outstanding. Both posterior longitudinal fasciculi are concerned in the regulation

of the ocular and head movements. The posterior longitudinal bundle is concerned not only with the motor functions already discussed but it contains functional capacities of a higher unity. It serves ideational purposes. It is not only a motor sensory pathway but also an ideational motor pathway. The posterior longitudinal bundle permits also functional capacities for objective space relationships and thus assists in the formulation of subjective spatial syntheses. Through its cortical connections mathematical formulations of space relationships are made possible. Without it Kant's philosophical idealism of spatial relationships would be impossible.

Finally, Spitzer in section X deals with what he terms idiotropic and oikotropic functions of the vestibular system. JELLIFFE.

Müller, L. R. DIE LEBENSNERVEN. IHR AUFBAU; IHRE LEISTUNGEN; IHRE ERKRANKUNGEN. Zweite Auflage. [Julius Springer, Berlin.]

Müller's monograph on the Vegetative Nervensystem, of which this is an enlarged rewritten second edition, was one of the notable achievements of neurology when it appeared in 1920. In its new form it is even more noteworthy.

It has only been within the past twenty years that internal medicine has commenced to awaken from the cramped orthodoxies of Virchow's cellular pathology and envisage the body as an integrated organism in which disease is not essentially a localized expression but a general response with secondary localizing factors. This integration is the province of the "Life Nerves" as Müller here deals with them and in his second edition he has increased his discussions of morphology, histology and physiology quite definitely. There is a much wider treatment of the midbrain synapses and the problems of metabolism under the regulating control of the vegetative nervous system are thoroughly entered into.

The new edition has had a rich coöperation of colleagues who have been associated with him in Augsburg, Würzburg and Erlangen and new and important chapters on clinico-pathological problems have been incorporated, thus rounding out the book, where before it was lacking.

This review could be enormously extended, and still fall below the praise which this book is worthy of. It is a masterly and valuable work and author and colleagues are to be congratulated. The work of the publisher should also receive the highest praise.

N. B.—All business communications should be made to Journal of Nervous and Mental Disease, 64 West 56th St., New York.

All editorial communications should be made to Dr. Smith Ely Jelliffe, Managing Editor, 64 West 56th St., New York.

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ORIGINAL ARTICLES

DOUBLE INNERVATION OF STRIPED MUSCLES: A REVIEW OF ITS IMPLICATIONS

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Recently (1924, a) I had occasion to draw attention to the double (somatic and sympathetic) innervation (*cf.* also the paper by Kulchitsky, 1924) which is present in the segmented mesodermal musculature of vertebrates, and I have been requested by the editor of this journal to review the situation created by this finding and its implications.

The *systema nervorum sympatheticum* has provided for all of us many trying hours during which we lost ourselves in the bewildering entanglement of abdominal or other plexuses, or else blazed a path through mazes of diagrams and text. No marked enthusiasm is likely to attend the announcement that the terminal ramifications of this system have been discovered to be even more extensive than we found them at that time.

Nevertheless, this is undoubtedly the case. Our textbooks made us familiar with the intricacies of the nerve net (plexus of Auerbach and Meissner) in the endodermal walls of the gut and, indeed, wherever unstriated (dermal) muscle occurs; but the equally intricate ramifications of the system (plexus of Bethe and of Prentiss) in the skin (ectoderm) and in the segmented or striated (mesodermal) musculature (plexus mihi) have not been so generally appreciated nor so widely accepted.

It may be paradoxical but it is nevertheless true that the recognition of this very complexity renders simpler the understanding of

the vegetative nervous system and of the part it plays in the vertebrate (including human) make-up.

In the first place, the universal occurrence of the sympathetic system in all three germ layers of the vertebrate body is in sharp contrast with the restricted occurrence of the somatic or cerebrospinal system in two germ layers only, *i.e.*, the ectoderm (skin) and the mesoderm (muscle, tendon, bone). To the morphologist this fact is of premier significance since it demonstrates:

1. That the widespread sympathetic nerve net is the ancestral nervous system (palingenetic), and
2. That the restricted somatic (cerebrospinal) system is a more recent phylogenetic achievement (cenogenetic).

The most obtrusive morphological characteristic displayed by the cerebrospinal system and the tissues it innervates is *segmentation*. Upon this morphological characteristic its physiological capacities depend. Its peripheral receptor fields (dermomeses) are segmented; so, too, its intermediate ganglionic transmittor masses (transmittomeses), its central sensorial fields (neuromeses), its ganglionic effector masses, or motor nuclei of the anterior cornu of the medullary tube (effectomeses), and its peripheral expressor tissues—the leverage system of muscle, bone, and joint (expressomeses). It therefore provided, when it arose, an invariability of bilaterally symmetrical, segmental muscular response to localized external stimuli (*i.e.*, an apparatus for moving directly forwards or backwards) in an animal hitherto capable of indirective movement resulting from the rhythmic (peristaltic) contractions of an unsegmented (dermal) smooth musculature.

All the above mentioned elements in the segmental reflex arc have suffered profound modification in phylogeny, so that any one arc can hardly act separately in any vertebrate; but we can approximate to an understanding of the fundamental animal want which provoked the emergence of this bilaterally symmetrical segmented apparatus in the ancestral form, by examining in a simple chordate, like amphioxus, the comparatively unaltered apparatus for body movement.

Amphioxus staggers us by its lack of achievements. It possesses no nose, no eyes, no trigeminus, no ears, no jaws, no head—in the usual sense of the term. It has no movable gill arches, no appendicular skeleton, and I recall no observations concerning transformations of its somitic products to form a diaphragm, a pelvic outlet, or any structures of that nature. There stands revealed in this elementary creature a plain, relatively unaltered, bilaterally symmetrical metamer-

ism whose only tangible significance is that of *directive body movement* in response to stimuli from segmentally arranged receptor fields. In other words, the simplest segmented system we know in the chordate stock is *exteroceptive*—*enteropressive*.

The physiological evolution of the segmented muscular tissue is not less impressive than that of the segmented nervous or osseous tissue, but it has frequently been wrongly conceived (Dart, 1922). Arising in response to one call only—the need for directive body movement—it was capable of being adapted to expedite the movement of individual parts of the body or even the gut. It is this intricacy in physiological evolution, resulting from the plasticity of the somites producing the segmented musculature, which has misled observers into classifying striated muscles in the region of the gills and pharynx as *visceral* and so confusing them with unstriated muscle (which does not arise from the somite but from the ectoderm or the endoderm, as the case may be, directly [Dart, 1922]).

We are to recognize that it was possible for the somites to migrate extensively and to give rise to segmented somatic muscles which could move tissues arising in any of the germ layers; *i.e.*, the eyes and skin (ectodermal), the bones (mesodermal), or the pharynx (endodermal). In short, just as the *exteroceptive* sides of the arcs have become modified especially in the head region by the development of the organs of special sense, which have replaced the original skin segments (dermomeres), so the *exteroceptive* sides of the arcs (expressomeres) have become profoundly altered in response to the needs of the vertebrate organism and have become (*propriopressive* [*e.g.*, jaw, facial, intercostal, perineal musculature, etc.]) or even *enteropressive* (musculature of deglutition, respiration, evacuation, etc.).

It is important to have discussed this quality of *segmentation*, which is confined to the ectoderm and the mesoderm and is absent from the endoderm (gut and the tissues derived from it), because this discussion will assist us later on in considering certain morphological issues and, at the present juncture, it aids us in discriminating between the physiological activities of the segmented musculature and those of the unsegmented musculature.

Superficially, these activities appear to differ markedly; thus dermal (unstriated) muscle displays “a slow velocity of propagation of the wave of contraction, a long reaction time and a low rate of metabolism,” whereas mesodermal (striated) muscle exhibits “a rapid

velocity of propagation of the wave of contraction, a brief reaction time, and a high rate of metabolism."

However, under suitable experimental conditions—*e.g.*, the tonic contraction excited in decerebrate rigidity, in tetanic toxin poisoning, by direct stimulation, automatically, as during hibernation or by shivering, or reflexly, as in the claspings muscles of frogs during the breeding season or voluntarily (*cf.* Bayliss, 1920)—it is found that mesodermal muscle reacts in the fashion of dermal muscle, displaying a diminished heat production and a general diminution of the rate of metabolism. It is this capacity which mesodermal muscle possesses, of reacting in this fashion during tonic contraction, which explains the capacity of patients clinically observed to maintain their muscular vitality to such a degree in diseases which evoke clonic or tonic contractions or phasic and postural reflexes, all of which latter, as Cobb (1924) has recently demonstrated, are "tetanic in character."

Hence, mesodermal muscle ordinarily reacts differently from the manner in which dermal muscle reacts, but it retains the capacity to react "dermally" when occasion demands. The differences are merely those of degree, and mesodermal muscle is dermal muscle which has achieved in phylogeny an additional (somatic) nerve supply and has gained in consequence additional physiological and morphological characteristics. There is phylogenetic truth in Mathews (1916) statement that "All muscle begins development as smooth muscle. Cross-striated muscle may be regarded as smooth muscle which has been differentiated into a special structure, securing thereby greater speed of contraction."

It seems to me that, when this physiological evolution of dermal muscle into segmented muscle and the subsequent changes wrought in the segmented musculature are taken account of, and when it is appreciated in addition that this myological evolution proceeds hand in hand with a correlated neurological evolution, we are in a position to understand many physiological and clinical facts which have hitherto been most obscure. Certain of these I have discussed in my recent article and certain others I will venture upon here later; but I wish to discuss, first of all, certain morphological matters which have more than an academic interest because they have affected so profoundly the neurological thinking of our age. It is impossible for the clinician to divorce himself from the experiences of the dissecting room, the embryology and neurology textbook, and the theories current in them. The whole of his after-experience is molded to an extraordinary degree by the conceptions he then assimilated.

When we were students we imbibed two neurological postulates just as a few years previously we had absorbed our catechism. These two postulates were:

1. That all neuroblasts were ectodermal in origin and came from the medullary plate or the neural crest;
2. That the sympathetic system arose from the cerebrospinal system.

Even if no evidence were available other than what has been recapitulated here we would be in a position to deny both of these postulates. The mere recognition of the specialized nature of the segmented or voluntary musculature and of the specialized demand it emerged to satisfy is sufficient to demonstrate the biological falsity of both of these doctrines. As I have said elsewhere, the most elementary consideration of the functions of alimentation, respiration, excretion, cohabitation, etc.—indeed, of any of the basal phenomena of mammalian life—teaches us that these phenomena were all originally involuntary, whatever the extent to which mammals may now bring their voluntary mechanisms to bear upon them. It is a “fundamental and immutable fact that the involuntary (sympathetic nerve net) mechanism came first everywhere in the body and that the voluntary (cerebrospinal segmented) mechanism with its invariability of response came in its train, not as renouncing the former, but as superimposing itself upon it and bridling it.”

In consequence:

1. The neuroblasts of the involuntary (sympathetic) system could not have been derived in phylogeny from the voluntary (somatic) system which came after it; and
2. Since we find these neuroblasts (which did not come from the voluntary system) distributed indifferently in the ectoderm (skin) and in the endoderm (gut), they undoubtedly arise indifferently from both germ layers in chordata, just as they arise indifferently from the ectoderm or endoderm in coelenterata (Hertwig, Parker, etc.).

The ectoderm is not the only source of neuroblasts.

I do not intend to detail here the further evidence that is available in support of a direct origin of neuroblasts from the endoderm and also from the mesoderm, but those interested in this particular question should consult the papers of Herbert W. Rand and Miriam F. Nuzum (1923) as well as those of Professor P. Masson of Strasbourg (1921–22), and of Masson's student, Louis Berger (1923).

The two neurological postulates mentioned, which we owe to His and his followers, are ontogenetically unsound and biologically false.

This theory of His fails to explain the distribution of the nervous systems in the body tissues of animals and is worthless as a key to the phylogeny of the nervous systems. Any modern theory of neurogenesis, to be trustworthy, must fulfil both of these desiderata, and the only theory which can fulfil these conditions is one that recognizes (1) that neuroblasts arise in all of the three germ layers, and (2) that the medullary plate is a very limited site of (intercalated, internuncial) neuroblastic origin. Such a theory was propounded by Professor J. L. Snellshear and myself some years ago (1921).

It is an amazing thing to find that neurological teaching has been dominated for practically four decades by postulates which rested upon one (embryological) type of evidence only, and that an evidence which is now demonstrably false. The cumulative evidence of comparative anatomy, physiology, pharmacology, and clinical observations has been powerless hitherto against the dictum of the embryologist. What is required now is an interpretation consonant with the facts elicited by all these lines of inquiry.

We may no longer speak with Gaskell (1916) of a "sympathetic outflow" from the cerebrospinal system, but rather of a "sympathetic inflow," whereby the activities of the already existent peripheral nerve net is brought into correlation with the newly arising cerebrospinal system. In this way a linkage system arises which becomes progressively evolved in phylogeny. As Gaskell himself recognized, there is no segmental arrangement of sympathetic ganglia (Grenzstrang, *cf.* Kappers, 1921) in lower chordates, but merely a nerve net, *e.g.*, acraniata, cyclostomi, and selachii. Even in dipnoi, teleostei, and ganoidei (giacomini) the only specialization in the nerve net system is that of ganglionic masses along the cardinal and segmental veins (in actual contact with their walls) and in their viscera. This ganglionic localization which takes place along the large vessels and in viscera seems to be the earliest expression of the transformations which anticipate the appearance of the *mimiosegmental* (as I have termed it) arrangement of the sympathetic chain which links the unsegmented nerve net to the segmented cerebrospinal system.

The recognition of the double innervation present in the mesodermal muscle affects in this way certain of the basal postulates of neurological teaching. It also affects certain basal postulates of biology. Hitherto it has been customary for zoölogical textbooks to teach:

1. That the phenomenon of segmentation is due to the demands of the expanding gut and its supposed derivative, the coelome;

2. That the mesoderm segments (somites) arise by outpouchings from the endoderm of the archenteric tube (Hatschek) and are comparable with the coelomic pouches of echinodermata.

In standard textbooks of embryology (*e.g.*, J. Graham Kerr) the striated musculature is treated under the heading of "coelomic organs." It will be remembered that in our survey of the distribution of *segmentation* in the organism we found that it affected only two germ layers—the ectoderm and the mesoderm. It is inconceivable that the endoderm, which never has become segmented, gave rise in phylogeny to an unnatural offspring—a segmented product, the striated musculature. Moreover, we have found that the demand which provoked the emergence of the mesoderm was not the expanding gut but the need for *directive body movement in response to external stimuli*. It is for this reason that we find only the ectoderm and the mesoderm segmented—to provide the segmental arc. The evidences of histology and physiology corroborate the view of those embryologists who, like Lwoff and Huber, believe in an origin of segmented mesoderm not from the unsegmented endoderm but from the segmented ectoderm. These problems have been analyzed in somewhat greater detail in another paper (1924, b). There are many morphological side issues affected by this question of segmentation and some are of great neurological interest, namely, the segmentation of the head and neck and, with them, of the cranial nerves, which has been a thorn in the flesh to morphologists since the childhood of embryological science. How these are affected by the new point of view has been touched upon in an earlier paper (1922).

Finally many physiological and clinical problems are affected by the discovery of the double innervation of mesodermal muscle. I refer here more particularly to the interest attaching to the histological demonstration of a *sympathetic motor innervation of the intrafusal muscle fibers of the organs of muscle sense (muscle spindles)*. On the morphological side it has been possible to adduce evidence of the part played by the sympathetic system, not only in the vasomotor phenomena of striated muscle but also in the phenomena of tonus (*cf.* text figure). The voluminous literature that has evolved within recent years upon this question supports the histological evidence, that the organ of muscle sense is designed to provide the cerebrospinal system with information concerning states of tension or tonus engendered in the intrafusal fibers, and not as has been ordinarily believed, information concerning mechanical impacts upon the spindle mechanisms acting from without. These states of tonus in the intrafusal

fibers are engendered by the activity of the peripheral sympathetic nerve network in the muscle.

If this conception is true, and the evidence in support of it is very considerable, many physiological phenomena (*e.g.*, the staircase phenomena, "muscle shivering" following cold, the "fibrillation" of muscles whose cerebrospinal innervation has been severed, etc.) are explicable neurologically, as also are many clinical phenomena (*e.g.*, "tremors," "fits," and "spasms" of muscle whether tonic, clonic, or tetanic). They are all reflexes in which rhythmicity is the dominant factor and are due to the unmasking of the phylogenetically older

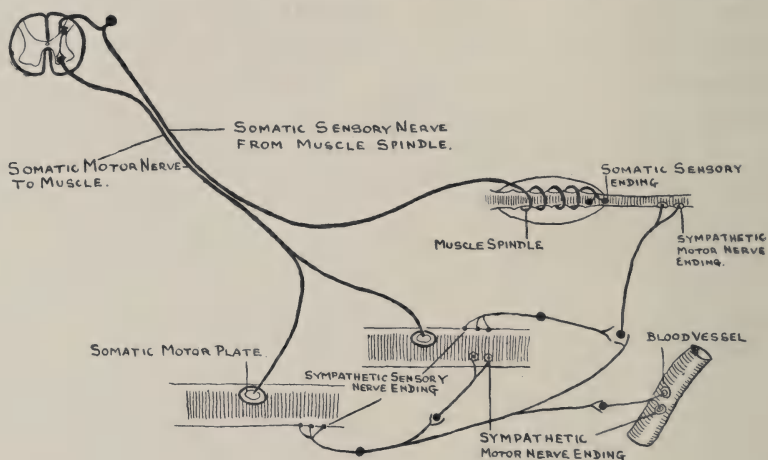


FIG. XIV. SCHEMA OF THE INNERVATION OF MESODERMAL (STRIATED) MUSCLE

rhythmical sympathetic apparatus. They find their closest analogies in the rhythmical movements of the gut musculature or of the medusa's swimming bell, and represent, as it were, revolts of the ancient inhabitants against the authorities ordinarily imposed by the more recent invader (the cerebrospinal system).

How far modern physiology is from taking an account of these facts will be evident if we examine certain of the deductions made from a consideration of the qualities presented by the rhythmical reflexes themselves. It is instructive as demonstrating the dependence of science upon theories that, just as we have witnessed in the hands of His, Balfour, Cajal, Kölliker, and their followers, the embryological apotheosis of the central nervous system, so in the hands of many workers, culminating in the researches of Sir Charles Sherrington and his students, we have witnessed the physiological

apotheosis of the same system. Thus, in his classical work, Sherrington (1906) traces the various phenomena characteristic of segmental reflexes in vertebrates to the central nervous system. Indeed, he goes further and makes these phenomena—to wit, summation, facilitation or “bahnung,” reinforcement, inhibition, fatigue, refractory phase, and the like—intraspinal.

Sherrington's view is dominated by the old belief (p. 314) that “although the nerve-net system is retained even in the highest vertebrates, it is then confined to unsegmentally arranged musculature, *e.g.*, visceral and vascular. In the skeletal musculature, where segmental arrangement holds, the nervous system is *synaptic*.”

Sir William Bayliss (1920) puts forward the same conception. He states (p. 399) that “the latter (involuntary muscle) are, in their natural, unstimulated condition, in a state of partial contraction, so that two sets of nerves are required, one set to increase the activity, which may therefore be called ‘excitatory,’ the other set to decrease it, ‘inhibitory’ nerves. The voluntary, skeletal muscles are, if unstimulated, completely at rest. They are supplied with one set of nerves only, those causing excitation, the other being needless. If continued tonic contraction is required it must be kept up by continued innervation from the nerve centers; so that to inhibit this state of contraction, influences must be brought to bear on the nerve centers themselves to stop their activity.”

We have learned, however, that this supposed difference between the two musculatures can no longer be retained, and since it cannot be retained it is obvious that the interpretations of the phenomena observed by Sherrington and others stand in need of revision.

I pointed out (*loc. cit.*, 1924, a) that the *summation* exhibited during the staircase phenomenon might reasonably be attributed to the operation of the peripheral sympathetic nerve net in skeletal musculature. If this is so, there can be little doubt that the decrease in latent time characteristic of the *incremental reflex* as compared with the latent time of the *initial reflex* is to be explained in the same way, *i.e.*, it is due to the increased peripheral tonus excited by the operation of the sympathetic nerve net in the muscle stimulated. This explanation seems more harmonious than any of those put forward concerning the latter phenomenon; *e.g.*, (1) that there is an involvement of a greater number of spinal motor neurones by a process of irradiation subsequent to an increased stimulus, or (2) that time is lost in the “setting” of other additional synapses, or (3) (as favored by Sherrington himself—p. 25) that “delay is

inherent in the process of transmission itself and that therefore the actual nervous transmission at these (synaptic) points has, when the stimuli are weak, a different order of speed to that in nerve fibers."

Facilitation or "bahnung," reinforcement, irradiation, and alliance are really only aspects of this same phenomenon of *summation* which is at bottom a sympathetic phenomenon. They will be better appreciated when it is recognized more generally that the sympathetic system is just as widely spread in the skin and in the skeletal musculature as it is in the gut and is capable in these localities of similar activities. We may take for example two series of Sherrington's classical experiments, the first showing that, when a subminimal stimulus is applied at a skin point, no reflex occurs, but the reflex does occur when a second subminimal stimulus is applied at a skin point some distance away on the receptive area for the reflex in question. The results of this experiment are expressed (p. 124) by stating that "the nearer the skin points of Ra and Rb lie together the greater the mutual reinforcement between the actions of their arcs on FC (final common) path." This is the phenomenon of reinforcement.

The second series (p. 218) shows that, when a reflex is tired out to stimuli at a certain spot, it is easily elicitable two centimeters or more away and this irrespective of whether the stimulation is mechanical or electrical. "When the spot stimulated second is close to the one tired out, the reflex shows some degree of fatigue, but not that degree obtaining for the original spot." This is the phenomenon of fatigue.

It is unnatural to divorce from a consideration of *summation* and its correlatives that of its inverse *fatigue* and its correlatives, which appear to be inhibition, inertia, refractory phase, and the like. Indeed, Sherrington has said (p. 65) that "the refractory phase is obviously akin to a state of inhibition," and we may certainly look upon the state of "fatigue" induced at the surface by excessive stimulation as "a more or less prolonged refractory phase succeeding nervous discharge."

These inverse qualities of summation and fatigue discoverable in the reflex arc appear at both its termini—the skin and the muscles; *i.e.*, stimuli and contractions may both be summated and both may become fatigued. There is one thing common to the termini and that is the sympathetic system. Both qualities are relatively independent of the nature (thermal, mechanical, electrical) of the stimulus, but both are influenced greatly by internal conditions such as blood supply, oxygenation, narcosis, and the like.

These qualities are deemed by Sherrington to be intraspinal and to dwell in the intraspinal synapses; yet he finds in all cases that their analogues are discoverable in the endodermal nerve-net phenomena of the gut or of the heart, and in the ectodermal nerve-net phenomena of the medusa. Thus, for example, he states: "Refractory phase appears therefore at the one end and at the other of the animal scale as a factor of fundamental importance in the coördination of certain motile actions. In the lowly animal form (medusa) it attaches locally to the neuromuscular organ, and so also in the visceral and blood-vascular tubes of vertebrates. But in higher forms (dog) refractory phase occurs as regards the taxis of skeletal musculature, not in the peripheral neuromuscular organ, but in the centers of the nervous system itself."

Such an interpretation is no longer viable. The universality of the nerve net in all metazoa and in all tissues of the vertebrate body, and the fundamental fact that the central system has been reared up upon it teach us that the part it plays in the reception of stimuli, although imperfectly known, is no less considerable than that which it plays in the expression and maintenance of them in the muscular organs. "It would not do, then," says Sherrington, "for the peripheral organ itself to be a clonic mechanism. The clonic mechanism must lie at some place where other kinds of reflex can preclude a clonic actuator from affecting the peripheral organ. Now such a place is obviously the central organ itself."

But the peripheral organ is a rhythmical neuromuscular organ, a "clonic mechanism," and it reveals itself as such as soon as the central organ is damaged by disease processes. It is not the function of the central organ to elaborate clonic and other rhythmical processes but to bridle them. The remark of Bayliss (*vide, supra*) that "the voluntary skeletal muscles are, if unstimulated, completely at rest," is highly questionable in the light of our knowledge of the "fibrillation of 'denervated' skeletal muscles" (Schiff, 1851; Hartman and Blatz, 1920) and in the light of Sherrington's statements (p. 339) that "the proprioceptors . . . both originate and maintain tonic reflexes in the skeletal muscles. . . . The steadiness and slight intensity of the contraction constituting the tonus render its detection difficult. Part of the discrepancy between the experimental findings may be traced to the supposition that a reflex tonus, if present, is present in all muscles at all times." The "fibrillation of so-called 'denervated' skeletal muscles" demonstrates that this "supposition" is a fact; it shows that the skeletal muscle is a clonic mechanism, and

it disposes of the contrast drawn by Bayliss (*vide, supra*) between the smooth and the striated musculatures.

In the phenomenon of *reciprocal innervation* the sympathetic plays a part whose magnitude can be estimated when we read (Sherrington, p. 312): "The coördination of a peristaltic movement of the bowel is, as shown by Bayliss and Starling, even when managed exclusively by the local diffuse nervous system, capable of perfect taxis of two muscular coats arranged antagonistically in the viscus. It directs a relaxation of the one coördinately with a contraction of the other; it exhibits a primitive but none the less perfect form of 'reciprocal innervation.'"

The step from the reciprocal innervation of dermal musculature of the gut to that of mesodermal musculature of the skeletal system is not a step from a peripheral nerve-net phenomenon to a central synaptic phenomenon, but is a step from an automatic reciprocal innervation to one which may be evoked from the skin, or otherwise interfered with by impulses mediated to the automatic apparatus from receptors situated at a distance, through the interposed segmental arcs and their intersegmental communications. Both depend upon the rhythmical vegetative nerve net.

Not only is the skeletal muscle a rhythmical mechanism, but so also is the skin, and in no way has this quality of the latter been more happily demonstrated than in the recent work of Waterston (1923) and of Herring (1923). Under the "law of fluctuation," which he regards as a necessary sequel to the "all or nothing" principle examined by Keith Lucas, Adrian and Forbes, and others, Herring has assembled many varied examples of "alternating periods of activity and rest in living tissues"—in other words, of summation and fatigue. Waterston has demonstrated this quality for the skin, both in respect of its varying "hot and cold spot" patterns following the "constant coming and going of activity of the different parts" and also in respect of the fluctuating distension of the peripheral capillaries.

These rhythmical (or fluctuating) phenomena of the skin receptors demonstrated by Waterston indicate that Sherrington's view, that in segmental reflexes "the seat of fatigue is intraspinal and central more than peripheral and cutaneous," is incorrect. We at least know that the skin receptors are a variable fatigable quantity. We know that not only the *receptor* but also the *expressor* side of the segmental arc (*i.e.*, the muscle) is characterized by a rhythmical quality just as smooth muscles are so characterized.

All these rhythmical fluctuant phenomena are to be attributed to the rhythmically reacting vegetative nervous system which forms the common nervous substrate of these tissues just as it does of all the body tissues of coelenterates (*e.g.*, medusa).

There is this degree of truth in the "dual mechanism" theory of Head and Rivers concerning sensation that one form of sensation—diffuse, nonlocalizable, fluctuant, throbbing, nonsegmental, *protopathic*—is to be attributed to the vegetative nerve net; whereas the other—the localizable, discriminative, segmented, *epicritic-deep sensibility* category—is attributable to the cerebrospinal system. I have briefly indicated in my paper (1924, a) the relationships of these to one another—that so-called "referred pain" represents a domination of the ancestral protopathic sympathetic over the cenogenetic epicritic segmented system, and that, for this reason, protopathic reactions found their nearest relatives in the colics and crises of the gut and other viscera. This attitude towards the problem of pain may lead us a step closer to an understanding of pain in the coelenterate and other lowly forms of life and hence to a more intimate knowledge of animal behavior.

I am of opinion that the sympathetic system plays a fuller part than has been admitted hitherto, not only in the reception of sensations from the skin, as is apparent from the researches of Waterston and Sherrington above referred to, but also in the reactions of the distance receptors. It can hardly be doubted that the movements of the pigment cells of the retina and the movements of the cones of the retina (*cf.* Bayliss, 1920) are any other than peripheral sympathetic phenomena just as are the movements of pigment cells in the general skin surface under the stimulus of light in invertebrata and in vertebrata. Nor is it without significance in this connection that throughout vertebrata (even in man) there is present a sympathetic specialization (*nervus terminalis*) closely correlated with the olfactory apparatus both peripherally and centrally. "Otocysts" are present in coelenterates and the sensations they mediate are transmitted by the nerve-net characteristic of these creatures. In the organ of Corti of vertebrates there is present, according to Kölliker (1902), "*die körnige intercelluläre Substanz in der die intraepithelialen Nervengeflechte und—Endigungen liegen und welche sich mit Goldchlorid (Ebner) und bei vitaler Methylenblaufärbung (Niemack) stark färbt.*" It has never been decided whether this apparatus is nervous but certain observers, such as Boettcher, Waldeyer, and Ichita Kishi, have maintained the "ganglionic cell" character of the

“zarte ästige Zellen mit blassen kleinen Kernen,” which are found interspersed in the dense nerve plexus lying in the tunnel-space of the organ of Corti between the inner and outer hair-cell layers (*vide* Kölliker).

These facts serve to indicate the need for a general revision of the microscopy of all the receptor organs with the ampler apparatus and technique of modern times—a microscopical revision which will undoubtedly throw fuller light upon the problems of sense reception in general. Meanwhile the facts observed support the view put forward that in the mediation of all the senses, not only thermal, tactile, and muscular, but also visual, olfactory, auditory, etc., the sympathetic system is vitally and functionally concerned.

In this summary I have done little more than refer to some of the general biological and physiological problems affected by, and the fields opened up to investigation from, this point of view. I have not entered into any of these fields in detail nor have I attempted to discuss the pharmacological and general clinical questions affected thereby, believing, as I do, that these applications of the knowledge follow readily from the anatomical and physiological facts already put forward.

In conclusion, I will seize the opportunity presented to state that the universality of the sympathetic innervation in vertebrate tissues—and the part played by it in all sensation, whether of the gut, the muscle, the skin, or the distance receptors—tends to confirm the views put forward by James, Lange, and Sergi (Sherrington, *loc cit.*, p. 259), that the “psychical process of emotion is secondary to a discharge of nervous impulses into the vascular and visceral organs of the body suddenly excited by certain peculiar stimuli.”

I do not mean that we can retain their doctrine in the form suggested by them but, in so far as these investigators believed the processes initiated by and dependent upon the sympathetic nervous system to be the *primary* factor in the emotional process, there is little doubt that they must be followed. The experiments cited by Sherrington as evidence for believing that “the visceral expression of emotion is *secondary* to the cerebral action occurring with the psychical state” did not eliminate the sympathetic system in the sense that we now know it, and are no evidence against these earlier authorities, whose theories have been so strikingly confirmed on the physiological side by the work of Cannon and his pupils and so unexpectedly extended on the histological and experimental side by the discoveries of those numerous investigators cited in my previous paper (1924, a).

The cerebrospinal system is a "coral isle" encircled on all sides by the ocean of the outside world, but the character of its interpretations of and reactions towards that ceaseless flux is dependent upon and modified by the intervening sympathetic "barrier reef." The phylogenetic ancestry of the sympathetic system and the rearing-up of the cerebrospinal system upon it is not a petrified morphological fact; it is a living anatomical reality which is fundamental to the whole of physic.

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THE TECHNIC OF PROGRESSIVE RELAXATION

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Progressive relaxation is a new method to bring quiet to the nervous system, including the mind. It has been in clinical use during the last six years with more than sixty patients. It is based upon physiological principles, and the use of the method requires an understanding of nervous physiology. A series of experimental investigations is now under way in the laboratories of the University of Chicago concerning various phases of the underlying physiology. Much remains to be learned and to be established. The field of functional neurology has too long seen speculations and opinions substituted for observations, even on the part of supposedly cautious scientists.

The advances of modern surgery, internal medicine, and most of the specialties have not been paralleled by an equal advance in functional neurology. It would seem that this is largely due to failure to investigate the physiology underlying common nervous and mental conditions.

The present method is submitted, partly for its practical application, but directly also as an instrument for physiological research. The latter use will be illustrated by giving a brief history of the development and use of the method in connection with certain laboratory problems.

Nervous individuals, as is well known, commonly react to a sudden, unexpected loud noise with a general start, often of the entire body. The involuntary start is a familiar event in everyday life, even with normal persons. In experiments begun in 1908 it was found that as many as eight or more such shocks per hour could be conveniently given with repetition of the start, thus permitting an extensive study of the phenomenon. Among other conditions that were varied during this study was the general state of contraction or relaxation of the striated musculature of the individual, to see what effect this would have upon the extent of the start. The individuals used in the experiment were as far as possible kept in ignorance of the problem. A striking result was found. The individual, in many cases at least, reacted with a violent start when he was generally

tense, and less when he was relaxed. Indeed, when relaxed the concussion often failed altogether to make him start, and it often lost its irritating, disagreeable character. However, there were classes of cases which were exceptions to the above rule, and in order to understand these it became necessary to simplify the conditions of the experiment. With Miss E. Lodor, and later Miss M. Miller, graduate students, my associates in the study of the involuntary start, it was found that the general start of the entire body was too complicated to make a simple graphic record that would serve for comparisons and quantitative results. Accordingly I finally turned to a more simple reaction for study, namely, that caused by a sudden brief shock from an induced current applied to the tip of the finger. This has been made to take place unexpectedly while the individual lies quietly on a couch. The arm is so secured that the only free movement is flexion at the elbow joint, and graphic records have been taken of the extent of reaction and the speed in thousandths of a second. These experiments will soon be published in full. Suffice it here to say that with six subjects out of seven the extent of reaction was notably less with the relaxed individual than when he was just lying idly on the couch; indeed, in a considerable proportion of the cases the hand of the relaxed individual did not even stir in the presence of the electrical stimulus.

Physiologists are showing a growing recognition of the importance of muscle tone and of the afferent sensations from muscles, joints, and other acting parts of the body. These proprioceptive impulses admittedly give rise to reflexes and to reflex tone, which constitute much of the activity of the living organism. This explains why the tense individual, with highly stimulated afferent nerves, reacts violently to shocks, in contrast with the poise of those who are relaxed. Furthermore, in an investigation presently to be published, the writer has shown that when afferent impulses are quieted through an increasing general relaxation the mind becomes correspondingly quiet. If the process is carried far enough, the individual, ceasing to think and to be otherwise active, naturally falls asleep. This branch of the work has been carried on with the aid of eleven subjects at the University of Chicago.

It is the purpose of the present paper to offer a more detailed description of the technic of progressive relaxation than has hitherto been given. Limits of space permit the description only of the elementary form, namely, general relaxation. A later paper will describe the more advanced types.

THE TECHNIC OF PROGRESSIVE RELAXATION

Like any new procedure, for instance a surgical operation, the present method is best learned by the physician who sees what is done rather than from a written description.

The aim is to train the patient by his own metal—*his own initiative*. He learns to localize tensions when they occur during nervous irritability and excitement and to relax them. It is a matter of *nervous reëducation*.

SECURING COÖPERATION OF PATIENT OR SUBJECT

If it is certain that the individual will strive to follow directions, no preliminary statement at all need be made. He simply lies down and the work begins. If desired, he may be informed that he is to learn to relax to an extreme degree.

If coöperation is a little doubtful, some preliminary explanation may be required. To avoid prejudicing the individual, it is best to tell him as little as possible in advance. Perhaps as he chats his hand fidgets nervously, or his brow becomes anxiously furrowed, or his legs shift restlessly; if so, these tensions may be pointed out to him as symptoms of nervousness that are to be relaxed. Not seldom the patient himself volunteers that he is habitually tense, often pointing to the apparent seat at the back of the neck, or across the brows, or stating that he often feels "bound up in a knot and cannot relax." This likewise opens a ready avenue of approach. Very often, however, the patient has never observed the connection between tenseness and nervous excitement, or between relaxation and nervous calm. To such a one, practice at relaxing a muscle seems absurd and out of place so far as his nervous troubles are concerned. If the individual will coöperate it is well to let his skepticism remain, for it will gradually yield when his observation and insight progress.

To inform the patient in advance of the complete purposes of the work and of the benefits he may expect, or that others have obtained, is unscientific. It must not be done if his record is to be of value for scientific investigation. To be sure, this involves a certain element of practical disadvantage, for the patient who is in the dark as to what is being done may be discouraged, and may even cease treatment. If the record is not desired for scientific study, but getting the patient well is the only purpose, it is possible to explain fully in advance. But unless this is done with extreme caution the patient may receive the explanation in a suggestive manner.

It is conceivable to use the present method along with suggestion.

just as it may be used along with bromides or other drug sedatives; but the conditions of scientific study require that suggestion be avoided.

GENERAL CONDITIONS

The patient or subject lies on his back on a comfortable couch or bed. A collapsible canvas couch is most convenient. The room is kept fairly quiet, at least during the first periods of practice. Periods last from one half to one hour. As many as eight patients or subjects may be handled at the same time, but in different rooms.

OUTLINE OF PROCEDURE

The individual is to be taught to recognize the presence of muscular contraction, no matter how slight.¹ After he reports that he recognizes contraction in a muscle-group, he is shown how to relax it extremely. This is to be done with almost all of the noteworthy muscle-groups of the entire body. He learns to recognize contraction in the various parts in a certain order. The large muscle-groups are studied first, because the sensation therefrom is most conspicuous. As he relaxes a given part, he *simultaneously* relaxes all parts that have previously received practice. The order most often used is: left biceps, l. triceps, l. hand flexors, l. hand extensors, right biceps, r. triceps, r. hand flexors, r. hand extensors, l. calf, l. foot extensors, l. leg flexors, l. leg extensors, l. thigh flexors, l. thigh extensors, abdomen, respiratory muscles, erectores spinae, l. pectoral group (forward extension of arms), l. interscapular group (backward movement of shoulder), r. pectoral group, l. interscapular group, elevators of shoulders, shrugging, bending head to right, to left, forward, back, holding it up stiffly, wrinkling the brow, frowning, closing eyelids tightly, with lightly closed lids turning eyes to look toward right, left, up, down, straight forward. Further eye work given at this stage will be described later. Smiling, rounding lips to say O; protruding tongue, retracting tongue, closing jaw tightly, counting one to ten, swallowing, complete the list.

THE RECORD TO BE KEPT

All instructions, no matter how casual, and even the substance of all remarks, are to be jotted down. To keep data in order, a record

¹There are various abbreviated forms of the present method. In one form, no training is given toward recognizing sensations of muscular contraction. The patient simply relaxes, as the reverse of contraction. A practical therapeutic end may perhaps then be attained, in certain acute conditions, with a single treatment or more. Such results, to be sure, will have little value or interest from a scientific standpoint.

sheet is required, and abbreviations or symbols may be used to stand for frequent procedures.

Date	No.	General Condition	Instructions	Old mm.	New mm.	Report	Success	Restlessness and Difficulties	Observations and Remarks	Pulse, B.P. & Bas. Met.

The headings of the columns are almost all self-explanatory. In the second column is the number of the period. In the sixth column is placed the abbreviated name of the muscle group, such as l. b., which first received practice opposite a given date. Should l. b. receive practice a second time, it will be found in the fifth column. The seventh column is reserved for the individual's subjective report, while the eighth and ninth serve for the objective data. The final column is reserved for pulse, blood pressure, and basal metabolism, when these are taken. If the description requires more space, the back of the sheet is used. During a particular period events recorded in various columns may have taken place in a certain temporal order; to designate this the letters of the alphabet are used before each notation. Then (a) represents the first event, (b) the second, etc.

A record is kept of the individual's ability to recognize the sensation of muscular contraction. For instance, when he contracts the right triceps, he is asked, "What do you experience?" If he replies, "A sensation from contraction there," and designates the place, it is recorded as +1S. + means success, the number means the number of reports, and S means spontaneously—or without instruction. If the notation were —2S +1I, it would mean that he twice failed to recognize the sensation of his own initiative, but reported positively when the location of the counteraction was pointed out to him. "I" stands for "instructed."

INITIAL INSTRUCTIONS

A minimum of words is to pass between the physician and the patient, who is to learn from concrete experience rather than discussion. The individual while lying down flexes his left arm and reports whether he notes the sensation from contraction of the biceps group. To strengthen the sensation, the physician offers passive resistance. Some patients get the sensation at once, while others require many repetitions, particularly the agitated and unobserving types.²

² The sensation is dull or faint, readily obscured by other experiences, fairly localized, but diffuse and ill-outlined, neither agreeable nor disagreeable, but particularly indistinct and characterless. It is to be distinguished from other somatic sensations—touch, warm, cold, pin-pain, tickle, but particularly from joint sensations and those due to pull upon tendons. The physician should be familiar with these distinctions, as learned in the average university course in experimental psychology.

When the sensation is clearly perceived while the individual is flexing, his attention may be sharply called to the issue by saying to him, "This is *you* doing! What we wish is simply the reverse of this—*not doing!*" As he then relaxes, he begins to learn clearly what it is, *not to do*. He begins to realize that progressive relaxation is not a positive something different from contraction, *but simply a negative*. After he has relaxed his arm for several minutes to illustrate this point, he is requested to contract it, and then to relax again. This time it is called to his notice that *his act of relaxation involved no effort*: he did not have to contract his arm or any other part in order to relax.³

If these points have evidently been assimilated the individual is made to contract the biceps again and then to let it go. He is requested to let the part go further and further every minute. "*Whatever it is that you do or do not do when you begin to relax, that you are to continue on and on, past the point where the part seems to you perfectly relaxed!*" This instruction, if clearly illustrated, conveys to the individual the meaning of progressive relaxation in terms of an immediate experience.

If he now lies quietly with eyes closed and seems to be set to relax, he may be left alone. The reader will remember that after the individual has relaxed in the popular sense there remains as a rule a certain degree of tension called "residual tension." To undo residual tension in a part may require as much as fifteen minutes. If he is restless and fidgety his attempt at relaxation may be interrupted, the biceps again contracted, and relaxation again begun.

It will be noted that only instructions are given the individual, just as if he were being taught a dance step or a stroke at billiards, or how to drive a motor car. No suggestions are given, in the technical sense of the word. From the outset he does everything for himself. If he fails he may be scolded and made to try again, which is entirely different from a suggestive procedure.

The entire first period may be devoted to the biceps, or one or more of the three following groups may be added. Occasionally it is well to vary the instruction with a phrase such as, "Just let the arm become as limp as a rag!" or "Go in the negative direction!"

FURTHER EARLY PROCEDURES

After the individual has become familiar with the entire arm the opportunity arises *to let him experience that a part need not be moved*

³ These are important points to learn, for the untrained individual who fails to relax, will contract various muscles in a vain effort to do so.

in order to be progressively relaxed. He is requested to "stiffen the arm without moving it, more so, still more, and still more! Then not quite so much, a little less, still less, and so on and on past the point where it seems perfectly relaxed, and ever further!" This is then taken as the type form of progressive relaxation for all subsequent work.

If the individual has displayed a delicate sense of recognition, he may then be made familiar with what I shall for brevity call "*diminishing tensions*." He flexes the arm with no resistance from the physician, and if he reports a sensation of tenseness the flexion is repeated half way, half way again, and so on. He is requested to flex so that the physician can scarcely note the movement. If he still reports positively, he is requested to go as if to flex it, but still a little less, so that no movement is discernible. Our laboratory subjects as well as patients have found that the sensation or experience of muscular contraction is again repeated, but is considerably fainter than before. Accordingly, if the beginner still reports positively he is requested to repeat again, but still less than before. After several diminutions from this stage the experience vanishes.

No one can learn to control his relaxation who does not know the difference between what we call "tenseness" and "strain." This test arises, for instance, when the individual extends his right arm forward and inward and reports where he notes the tenseness. A common error is for him to point to the back of his shoulder region, for here the sensations are strongest, and he fails altogether to note the tenseness in the pectoral region. If he makes this error he is requested to keep the arm relaxed while the physician pulls it in the same direction as previously. The alert observer then notes the same sensation as before in the posterior region, showing that this cannot be "tenseness." It is agreed to call sensation from behind "strain." This opens the opportunity for the individual to look further for the sensation of tenseness. When finally localized, perhaps with assistance from the director, the distinction becomes apparent. It is illustrated that sensations of tenseness are readily overlooked because of their relative faintness.⁴

THE OBJECTIVE ESTIMATION OF CONTRACTION AND RELAXATION

While the patient judges his progress by the diminution of the sense of contraction, the physician watches closely for external signs. Objective tests of advancing relaxation include: (1) palpation of the muscle group; (2) passive motion of the part; (3) observation of

⁴ These sensations are "unconscious" in the sense that they are commonly overlooked. Without doubt in this sense, "unconscious" experiences can be relaxed away.

the regularity and force of respiration; (4) visual observation of the flaccidity of the muscle-group or region; (5) the absence of movement or contraction, including speech and winking of the closed eyes; (6) the presence of a sudden involuntary start or jerk, often generalized, which often marks the onset of advanced relaxation in an individual who has been previously hypertense; (7) increasingly slow responses to interruption, or the failure to respond; and (8) the sleepy-eyed appearance of the individual who arises after successful relaxation; (9) when the individual learns to relax the eyes while open, their vacuous appearance, with the facial musculature so relaxed that it is expressionless, is characteristic; (10) graphic records of respiration, pulse, eye-movements, or of the tone of internal organs may be employed. In certain instances, fluoroscopy and Roentgen films have been used.

ADVANCED INSTRUCTIONS

The patient practices at home for an hour or two per day, after he has once learned what to seek. *He relaxes, but does not repeat the preliminary contractions when alone.* Most persons do better alone than at the physician's office. Generally they have questions to ask and difficulties which they wish to overcome. A common complaint is an unyielding tenseness of the neck muscles, even after this region has received practice. To aid in overcoming this, the patient is shown that it is he who is holding the neck stiff: he is requested to hold it stiffer, more so, more so, extremely stiff—not quite so extremely—a little less, a little less, and so on and on. This process may have to be repeated often at succeeding periods. This again illustrates what was called "*diminishing tensions.*"

Repetition is the keynote of the entire method of progressive relaxation. It is the old story of, "If at first you don't succeed, try, try again!" The principles involved are very simple. That is just the trouble: they are too simple. It is just the negative of doing that is required, and everybody is capable of this, since whoever can raise his arm, for instance, is also capable of not raising it. But when requested to relax the average individual does not do the simple thing: instead, he makes various efforts. *Instruction in relaxation largely consists in preventing the beginner from doing the wrong thing.*

Often the patient asserts that he cannot relax. It would be unscientific for the physician dogmatically to tell the patient that he can, for precisely this is to be proved in each case. But it is safe to point out that he has no proof that he could not relax and that it is better to stick to the facts: he did not relax. No assumption need

be made either way, and it is sufficient if the patient, however skeptical of results, keep an open mind and persist in his endeavors. Nevertheless many patients persist in saying that they cannot, and so they fail to try when they should: it is well to show them that they can contract any muscle by having them do so, and then, while having them cease that same contraction progressively, demonstrate for at least this instance the absurdity of the claim that they *cannot* relax.

There are other matters which can be but touched upon here: Upon failure to recognize or localize a particular tension a preliminary period of relaxation may aid. Another point worthy of mention is that the patient as a rule continues at his affairs, but his life is to be reorganized so that rush, strain, and worry are at a minimum. So far as possible he is to keep relaxed during his daily duties. He is not to make a task of learning to relax, but is to have an attitude of *laissez-faire*. If he complains that he finds it hard to lie quietly at practice, he is evidently confused about what is wished. For he has never been instructed to hold still, since this is not relaxing. Let him stiffen his arm, holding it still, and it will become clear that this is a form of tenseness, not relaxation. It should be demonstrated to him that it is never "hard" to relax, for this word implies effort. Of course an untrained individual may stiffen up when requested to relax, and so make a task of it, but this is not relaxation, for it is only an unsuccessful attempt. Correct speech is important for a clear understanding: every person will find that he does not readily relax on some occasions, and it is proper to say so. On some days he will have farther to go, more tenseness to undo, than on others. But the patient who complains of his practice gives a clear indication that he is doing something wrong. He is doing, in place of undoing. When he announces that he is beginning to enjoy it, it is likely that he has found the right track.

RELAXATION OF THE EYES

The ability to relax the eyes, including the brow and the lids, is a crucial test of skill. It is easy for most persons to distinguish tenseness in wrinkling the forehead. This region is then permitted to flatten out for a period of ten minutes or more until it is successfully done. After frowning the brow likewise is gradually unfrowned. Next in order, the lids of the closed eyes are shut still more tightly and the tenseness noted (*orbicularis oculi*). These are gradually let go, until the physician notes that wrinkling of the closed eyes has become less frequent. After a period of relaxation, without moving the head, the individual looks to the right, noting the ocular tension, then left, up, down, and straight forward. Each movement

is repeated until the experience is clear. Then he is directed to let the eyes go completely, just as he let the arm go. He is not to seek to look in any direction. If he fails he is made to contract the arm, then gradually to let the arm and eyes relax together. As a rule many repetitions are needed.

After a fair measure of success the eyes are opened. The physician, standing at the foot of the couch, holds his index fingers horizontally about three feet apart to permit the patient to look from one finger to the other and report his experience. This is repeated with half the distance, then about two inches apart. Next a single finger is held up for some seconds. If successful, the same is done in the vertical direction. The subject should report, in each test, without any help from the physician, that he looked from finger to finger and noticed tenseness of eye-movement. Often he does not get it at all at first. If he uses the term "eye-strain," he is required to explain what he means. It has been agreed to call a certain sensation "tenseness." *Whenever doubt arises, the biceps should be flexed again in order to illustrate the experience.* In case of failure to perceive tenseness in convergence upon the single finger, that member may be held close to the eyes, for this brings out the sensation more distinctly. When the individual has become adept at noting tensions of the open eyes *the physician shows him by example how to relax the eyes while open*; for learning to relax, like learning any other new art, is often most readily done by *imitation*.

He is now ready for practice at relaxation of eyes open and eyes closed.

RELAXATION OF MENTAL ACTIVITIES ⁵

The patient often continues to complain that his "mind keeps on working" after he lies down to relax, and perhaps this keeps him from sleeping. Some even inquire in advance whether muscular relaxation will quiet the mind. In place of answering such complaints or queries directly, the matter is left to the individual's own observation. Thus prejudice is avoided. *At no time is the instruction given to stop thinking, or to make the mind a blank. The instruction to relax muscles progressively pervades the entire course, and whatever is said always points in this one direction.*

With the eyes closed, the individual is requested to imagine a motor car passing and to report his experience. Often the physician can note a quick movement of the eyeballs beneath the lids. The patient may report that he saw the car in imagination, and felt tense-

⁵As previously noted, this subject has recently been investigated with normal individuals at the University of Chicago and an account will be published following the present article in the American Journal of Psychology.

ness in movement of the eyes to follow the car. The same is done with other simple objects, moving or stationary, such as a train passing, a bird flying, a flower fluttering in the wind, a blade of grass, a ball on the ground, a sailboat in the distance. As skill is gained in noting these slight ocular tensions, the experience may be made somewhat more complex, and the patient may report his experience after solving a simple problem in mathematics, or thinking of some social or business matter. In each case, as a rule, he notes visual images and corresponding ocular and other tensions.

Of course the physician must not even hint to the patient that he is to look for other tensions during visual imagination; for if the investigation is to have scientific value the patient must observe for himself. Even if only therapeutic results are desired, it is better the more the patient is made to rely on his own observations; but if time must be saved the patient may for merely practical purposes be told what he is to observe. This makes the matter easy.

The patient finds for himself—with no hint from the physician—that when he has learned to relax such slight ocular tensions as take place during the activity of imagining, the mind ceases to be active.

After serial practice with the musculature of the face, jaws, and tongue, the patient counts to ten, noting the various tensions in the speech apparatus. The method of "diminishing tensions" is again resorted to. He counts half as loud, notes the processes, then scarcely perceptibly, then not quite perceptibly, then less than this, and again less. This is the same as imagining from one to ten in verbal terms. Upon relaxing the speech apparatus such imagination of course vanishes.

Thereupon he may imagine speaking in various ways, such as telling a waiter to bring his dinner, or requesting a conductor to let him off the car. The observing patient reports that he has slight tensions in the tongue, lips, or throat as he speaks in imagination. Imagining sounds is also accompanied by tensions, usually ocular, sometimes possibly in muscles about the ear, although the latter has not yet been established.

It requires extreme progressive relaxation of the muscles of the eyes and speech apparatus to quiet the mind. The individual simply lets these muscles go extremely as he lets go the muscles of the arm. Practice is required before this is accomplished, and the patient may continue to gain skill after he has been discharged.

There are more advanced forms of technic than above described, but they must be reserved for a future paper. I am indebted to Professor A. J. Carlson for a critical reading of this article.

A COMPARISON OF THE RESULTS OF TESTS IN THE TERMAN SCALE BETWEEN CASES OF MANIC DEPRESSIVE AND DEMENTIA PRECOX PSYCHOSES ¹

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The material for the following analysis has been gathered from hospital records of Terman tests given to patients whose final diagnosis was a manic depressive or dementia precox psychosis, and from the Terman records of 35 manic depressive and 15 dementia precox cases examined by the writer. All cases where language difficulty existed, were ruled out. Among the cases examined by the writer, the record of any patient who was accessible and whose final diagnosis was MD or DP, was utilized, but when a patient showed distinct hostility or lack of effort, the record sheet, if made at all, was thrown out. Other Terman records were taken just as they occurred in the hospital records under the large psychotic grouping of MD or DP. The aim was to allow the sub-groups to enter these records in the same proportion in which they occur.

Hospital diagnostic classification for manic depressive psychosis can always be grouped under one of the following heads: manic depressive manic; manic depressive depressed; manic depressive mixed. Under MDM come hypomania and acute mania. Records of delirious mania were, of course, out of the question. Under MDD come cases of simple retardation and those of acute melancholia. Under MD Mixed occur such states as follow: maniacal stupor, agitated depression, unproductive mania, depressive mania, depression with flight of ideas, akinetic mania.

For dementia precox, the sub-groups are distinguished as catatonia, hebephrenia, paranoid forms, DP simplex, and DP "others", this latter meaning that important complications have occurred along with dementia precox. Cases of DP "others" were not used as a sub-group for analysis, but were counted under the large psychotic grouping.

¹ The writer wishes to express thanks to the following hospitals for their coöperation in gathering material for this research: Manhattan State Hospital, Boston Psychiatric Hospital, King's Park Hospital, and the Brooklyn State Hospital.

In compiling the records, where the basic year was known, all preceding tests were counted as plus. This assumption seems justified if one accepts at all the principle that the basic year represents a point through which all tests have been successfully passed. Furthermore, there are certain types of tests, those for the digit span, for the vocabulary, and for the fables, which run through two or more years, and differ between years only in the extent of the digit series, vocabulary, or fable-lessons that must be comprehended at that year. In these cases, where a test was passed, those of its type which preceded it were counted as plus also. For instance, if XIV a1 was passed, then X a11, IV 6, and III a1 were also counted as plus. Of course the basic year may have cut in at some point, as for instance at X, and in that case, the preceding tests were plus in any case. The following table shows the tests which correspond.

DIGITS		VOCABULARY		FABLES	
Forward	Backward				
III a1	VII a12	VIII 6		XII 5	
IV 6	IX 4	X 1		XVI 2	
VII 3	XII 6	XII 1			
X a11	XVI 5	XIV 1			
XIV a1	XVIII 5	XVI 1			
XVIII 3		XVIII 1			

The number of cases passing and failing each test were now listed for the sub-group of each psychosis.

The following table gives these records:

RESULTS FOR TYPES OF MD AND DP PSYCHOSES								
	MDM	MDD	MDX	DPH	DPP	DPS	DPC	
	+	—	+	—	+	—	+	—
III 1.....	9 0	3 0	8 0	1 0	0 0	0 0	0 0	0 0
2.....	9 0	3 0	8 0	1 0	0 0	0 0	0 0	0 0
3.....	9 0	3 0	8 0	1 0	0 0	0 0	0 0	0 0
4.....	9 0	3 0	8 0	1 0	0 0	0 0	0 0	0 0
5.....	9 0	3 0	8 0	2 0	0 0	0 0	0 0	0 0
6.....	9 0	3 0	8 0	2 0	0 0	0 0	0 0	0 0
a1.....	11 0	11 0	16 0	8 0	16 0	7 0	1 0	0 0
IV 1.....	9 0	3 0	8 0	0 1	1 0	0 0	0 0	0 0
2.....	9 0	3 0	8 0	0 1	1 0	0 0	0 0	0 0
3.....	9 0	3 0	8 0	0 1	1 0	0 0	0 0	0 0
4.....	8 0	3 0	8 0	1 1	1 0	0 0	0 0	0 0
5.....	9 0	3 0	8 0	0 1	1 0	0 0	0 0	0 0
6.....	13 0	11 0	16 0	6 0	25 0	11 0	2 0	0 0
a1.....	8 0	3 0	8 0	1 0	0 0	0 0	0 0	0 0
V 1.....	8 0	3 0	8 0	1 0	3 0	1 0	0 0	0 0
2.....	9 0	3 0	8 0	2 0	3 0	1 0	0 0	0 0
3.....	9 0	3 0	8 0	2 1	3 0	1 0	0 0	0 0
4.....	9 0	3 0	8 0	2 1	3 0	1 0	0 0	0 0
5.....	8 1	3 0	8 0	2 0	2 1	1 0	0 0	0 0
6.....	9 1	3 0	8 0	0 0	0 0	0 0	0 0	0 0
a1.....	8 1	3 0	8 0	1 1	1 0	0 0	0 0	0 0

RESULTS FOR TYPES OF MD AND DP PSYCHOSES—Continued															
		MDM		MDD		MDX		DPH		DPP		DPS		DPC	
		+	—	+	—	+	—	+	—	+	—	+	—	+	—
VI	1.....	10	1	3	0	8	0	4	0	4	0	0	0	0	0
	2.....	9	0	3	0	8	0	2	1	4	1	0	1	0	0
	3.....	9	0	3	0	8	0	3	0	5	0	1	0	0	0
	4.....	9	0	3	0	8	0	3	0	4	1	2	0	0	0
	5.....	9	0	3	0	9	0	2	1	5	0	1	0	0	0
	6.....	8	1	3	0	9	0	2	1	4	1	1	0	0	0
	a1.....	7	0	3	0	5	0	2	0	1	0	1	0	0	0
VII	1.....	12	0	7	0	13	0	6	1	8	0	3	0	1	0
	2.....	9	0	6	0	14	0	6	2	6	1	3	1	1	0
	3.....	10	1	12	0	16	1	15	2	24	1	11	0	0	1
	4.....	6	1	6	0	8	0	6	0	4½	0	3	0	0	0
	5.....	5	3	6	0	12	1	7	1	7	2	3	0	1	0
	6.....	8	3	11	1	9	1	5	0	5	0	3	0	0	0
	a11.....	4	0	5	0	6	0	7	0	4	0	2	0	1	0
	a12.....	7	1	15	1	15	1	15	1	29	1	11	0	2	0
	VIII	1.....	2	6	3	3	4	4	6	4	7	5	3	3	2	0
2.....		8	0	5	0	7	0	11	1	15	0	6	0	0	1
3.....		6	2	4	1	5	2	9	3	10	4	5	1	1	0
4.....		4	4	4	2	6	2	8	4	13	1	5	1	1	0
5.....		9	0	5	0	6	1	10	3	13	1	6	0	0	0
6.....		10	1	11	0	12	0	17	0	32	0	14	0	2	0
a11.....		1	0	0	0	2	0	1	0	1	0	0	0	0	0
a12.....		0	0	0	0	0	0	0	0	1	0	0	0	0	0
IX		1.....	7	4	6	1	6	6	8	8	19	5	9	0	2	0
	2.....	3	0	2	2	2	2	5	5	16	3	6	4	2	0
	3.....	12	0	4	1	11	1	14	3	24	1	10	0	2	0
	4.....	5	6	10	1	9	3	13	7	26	7	11	2	1	1
	5.....	6	3	5	0	7	3	9	4	9	8	6	1	2	0
	6.....	2	6	2	1	8	2	7	4	8	7	3	1	1	0
	a11.....	12	0	4	0	11	0	12	1	13	2	7	0	1	0
	a12.....	4	0	5	0	2	1	2	0	7	1	3	2	0	0
	X	1.....	9	1	11	1	9	3	14	4	28	2	14	1	2	0
2.....		3	9	3	5	3	8	3	14	10	17	5	6	1	1
3.....		1	11	2	6	0	10	7	11	12	19	4	9	0	2
4.....		0	4	2	4	5	6	10	6	19	6	9	2	0	1
5.....		9	2	8	1	8	4	6	5	20	4	9	0	2	0
6.....		2	6	2	4	0	8	4	1	7	2	3	1	0	0
a11.....		2	7	6	1	6	5	11	3	18	9	10	4	1	1
a12.....		0	1	2	1	0	1	2	1	7	4	5	2	0	0
a13.....		3	0	5	0	0	2	12	3	19	3	11	3	2	0
XII	1.....	5	5	9	2	5	7	10	8	23	7	9	6	1	1
	2.....	3	9	8	1	6	5	10	8	18	9	11	4	2	0
	3.....	0	11	5	6	2	9	2	15	15	13	6	9	0	2
	4.....	3	9	7	4	5	4	9	9	15	14	8	8	0	2
	5.....	2	9	7	5	2	8	4	14	12	17	6	10	0	1
	6.....	3	9	9	3	3	9	6	17	16	17	6	10	1	1
	7.....	7	5	8	4	6	5	6	13	17	15	9	6	1	1
	8.....	2	9	7	5	2	6	8	10	15	16	7	8	1	1
XIV	1.....	3	10	5	6	3	9	6	11	16	14	7	8	1	1
	2.....	4	4	3	5	1	3	6	5	16	7	5	8	0	2
	3.....	0	7	3	7	2	7	3	9	6	20	1	9	0	2
	4.....	2	7	8	3	4	4	9	9	12	15	4	10	0	1
	5.....	3	6	3	9	1	9	7	7	11	18	3	11	0	2
	6.....	2	7	2	5	1	5	2	8	5	14	4	9	0	2
	a1.....	0	6	6	4	3	7	2	13	7	22	5	10	0	2

RESULTS FOR TYPES OF MD AND DP PSYCHOSES— <i>Continued</i>															
		MDM		MDD		MDX		DPH		DPP		DPS		DPC	
		+	—	+	—	+	—	+	—	+	—	+	—	+	—
XVI	1.....	0	10	2	9	1	10	2	14	7	23	4	11	0	0
	2.....	0	12	4	8	0	10	0	17	2	26	0	15	1	0
	3.....	8	7	5	2	1	4	1	9	6	11	1	9	0	0
	4.....	2	5	4	5	2	6	2	8	5	16	1	9	0	0
	5.....	1	10	2	9	2	10	3	17	3	26	1	10	0	1
	6.....	0	1	0	0	0	0	0	5	1	8	1	3	0	0
	al1.....	0	5	1	4	0	4	0	6	3	13	0	6	0	0
	al2.....	0	2	1	1	0	2	0	1	0	6	0	2	0	0
XVIII	1.....	0	12	1	9	1	10	0	17	1	24	0	10	0	0
	2.....	0	0	2	3	0	0	0	3	2	11	1	3	0	0
	3.....	1	6	3	5	1	8	0	13	1	25	2	9	0	1
	4.....	0	1	2	2	0	2	0	4	4	9	2	3	0	0
	5.....	0	12	2	10	1	1	2	19	2	24	2	12	0	1
	6.....	0	0	1	4	0	1	0	3	2	7	1	2	0	0

From this material those tests were selected in which records for thirty cases or over, appeared. The tests in which less than this number occurred, are typed heavy, and are to be omitted from further consideration. In the tests to be considered, I found the per cent of cases who passed and of those who failed, to the total number of cases for each test. For example: In XII, 2, for MD psychosis, there was a total of 48 cases, 26 passed; 22 failed. Fifty-four per cent of the total number of cases passed, therefore, and 46 per cent failed. These per cents for plus and minus are given for each test in the table:

									Difference in per cent between those passing In favor of MD In favor of DP	
		Total DP		Per cent	Total MD		Per cent			
		+	—		+	—				
III	1.....	11	0	100	34	0	100	..	..
	2.....	11	0	100	34	0	100	..	..
	3.....	11	0	100	34	0	100	..	..
	4.....	11	0	100	34	0	100	..	..
	5.....	11	0	100	34	0	100	..	..
	6.....	11	0	100	34	0	100	..	..
	al.....	52	0	100	35	0	100	..	..
IV	1.....	10	1	91-9	34	0	100	9	..	
	2.....	10	1	91-9	34	0	100	9	..	
	3.....	11	0	100	34	0	100	..	..
	4.....	11	0	100	33	0	100	..	..
	5.....	10	1	91-9	34	0	100	9	..	
	6.....	69	1	99-1	36	0	100	9	..	
	al.....	9	0	100	34	0	100	..	..
V	1.....	13	0	100	33	0	100	..	..
	2.....	13	1	93-7	35	0	100	7	..	
	3.....	13	1	93-7	35	0	100	7	..	
	4.....	13	0	100	35	0	100	..	..
	5.....	13	1	93-7	34	1	97-3	4	..	
	6.....	8	0	100	35	1	97-3	..	3	
	al.....	11	1	92-8	34	1	97-3	5	..	

		Total DP		Per cent	Total MD		Per cent	Difference in per cent between those passing	
		+	-		+	-		In favor of MD	In favor of DP
VI	1.....	18	0	100	35	0	100	..	..
	2.....	16	2	89-11	33	2	94-6	5	..
	3.....	17	0	100	35	0	100	..	..
	4.....	16	1	94-6	35	0	100	6	..
	5.....	17	2	89-11	35	0	100	11	..
	6.....	16	3	84-16	34	1	97-3	13	..
	a1.....	11	0	100	29	0	100	3	..
VII	1.....	28	1	97-3	40	0	100	7	..
	2.....	24	3	89-11	40	0	100	11	..
	3.....	67	3	96-4	42	5	89-11	..	7
	4.....	19	0	100	26	1	96-4	..	4
	5.....	27	3	90-10	30	3	91-9	1	..
	6.....	20	1	95-5	21	6	78-22	..	17
	a11.....	19	0	100	18	0	100	..	..
	a12.....	70	4	93-7	41	3	93-7	0	0
VIII	1.....	30	16	65-35	21	21	50-50	..	15
	2.....	43	4	91-9	39	2	95-5	4	..
	3.....	37	9	80-20	33	8	80-20	0	0
	4.....	37	9	80-20	33	9	79-21	..	1
	5.....	36	6	86-14	38	4	90-10	4	..
	6.....	79	1	99-1	54	1	98-2	1	..
	a11.....	6	0	100	18	0	100	..	..
	a12.....	4	0	100	12	0	100	..	..
IX	1.....	48	18	73-27	33	14	70-30	..	3
	2.....	32	21	60-40	10	7	59-41	..	1
	3.....	59	6	91-9	44	4	92-8	1	..
	4.....	59	23	72-28	35	17	67-33	..	5
	5.....	37	13	74-26	32	10	76-24	2	..
	6.....	26	14	65-35	19	18	51-49	..	14
	a11.....	37	4	90-10	44	0	100	10	..
	a12.....	17	1	94-6	14	2	87.5-12.5	..	6.5
X	1.....	71	8	90-10	39	9	81-19	..	9
	2.....	26	45	37-63	19	31	38-62	1	..
	3.....	27	53	34-66	6	41	13-87	..	21
	4.....	45	20	69-31	27	18	60-40	..	9
	5.....	44	11	80-20	40	10	80-20	0	0
	6.....	17	7	71-29	9	29	24-76	..	47
	a11.....	45	23	66-34	21	17	55-45	..	11
	a12.....	18	6	75-25	5	4	55.5-44.5	..	19.5
	a13.....	54	14	79-21	13	3	81-19	2	..
XII	1.....	55	29	65-35	28	19	60-40	..	5
	2.....	50	28	64-36	26	22	54-46	..	10
	3.....	27	53	34-66	9	40	18-82	..	16
	4.....	38	41	48-52	21	27	44-56	..	4
	5.....	26	51	34-66	12	38	24-76	..	10
	6.....	39	51	43-57	21	32	40-60	..	3
	7.....	45	41	52-48	33	19	63-37	11	..
	8.....	40	42	49-51	21	29	42-58	..	7
XIV	1.....	37	46	45-55	18	29	38-62	..	7
	2.....	31	29	52-48	8	15	35-65	..	17
	3.....	13	28	32-68	10	33	23-77	..	9
	4.....	21	48	30-70	19	26	42-58	12	..

		Total DP		Per cent	Total MD		Per cent	Difference in per cent between those passing	
		+	—		+	—		In favor of MD	In favor of DP
	5.....	26	47	36-64	7	46	13-87	..	23
	6.....	15	38	28-72	9	20	31-69	3	..
	a1.....	16	61	21-79	13	24	35-65	14	..
XVI	1.....	12	63	16-84	5	41	11-89	..	5
	2.....	7	68	9-91	5	45	10-90	1	..
	3.....	11	38	22-78	8	22	27-73	..	5
	4.....	8	47	15-85	12	25	32-68	17	..
	5.....	11	52	17-83	7	45	13-87	..	4
	6.....	1	15	6-94	0	2	..	..	..
	a11.....	4	34	11-89	2	22	8-92	..	3
	a12.....	0	2	..	1	4	20-80	..	..
XVIII	1.....	2	76	3-97	2	48	4-96	1	..
	2.....	5	20	20-80	2	7	22-78	2	..
	3.....	6	70	8-92	6	29	17-83	9	..
	4.....	6	17	26-74	3	10	23-77	..	3
	5.....	6	81	7-93	5	49	9-91	2	..
	6.....	4	17	19-81	1	7	12.5-87.5	..	65
Average per cent DP passed, 69.57.				Average per cent MD passed, 68.33.					
Average per cent DP failed, 30.43.				Average per cent MD failed, 31.67.					

From these results a graph was made to show the percentage of MD and of DP patients who passed each test under consideration. (The percentage failing is, of course, the difference between that per cent and one hundred.)

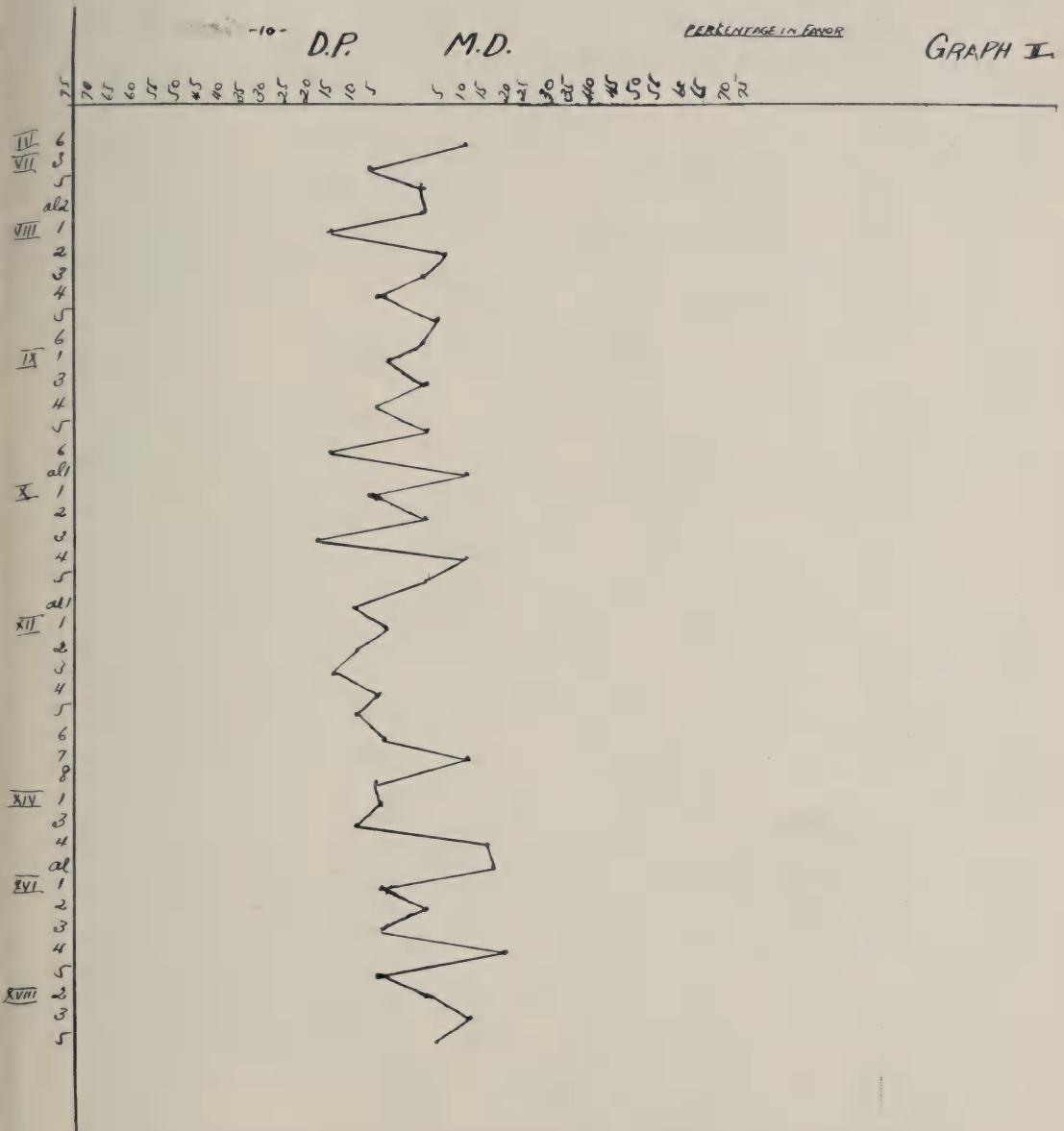
A second graph which may present the results from another angle shows the difference in per cent of those passing each test, made by MD and DP cases.

As will be seen, there is not a striking difference in records made by DP and MD patients. The similarity, following as it does, a very uneven line, is rather more striking.

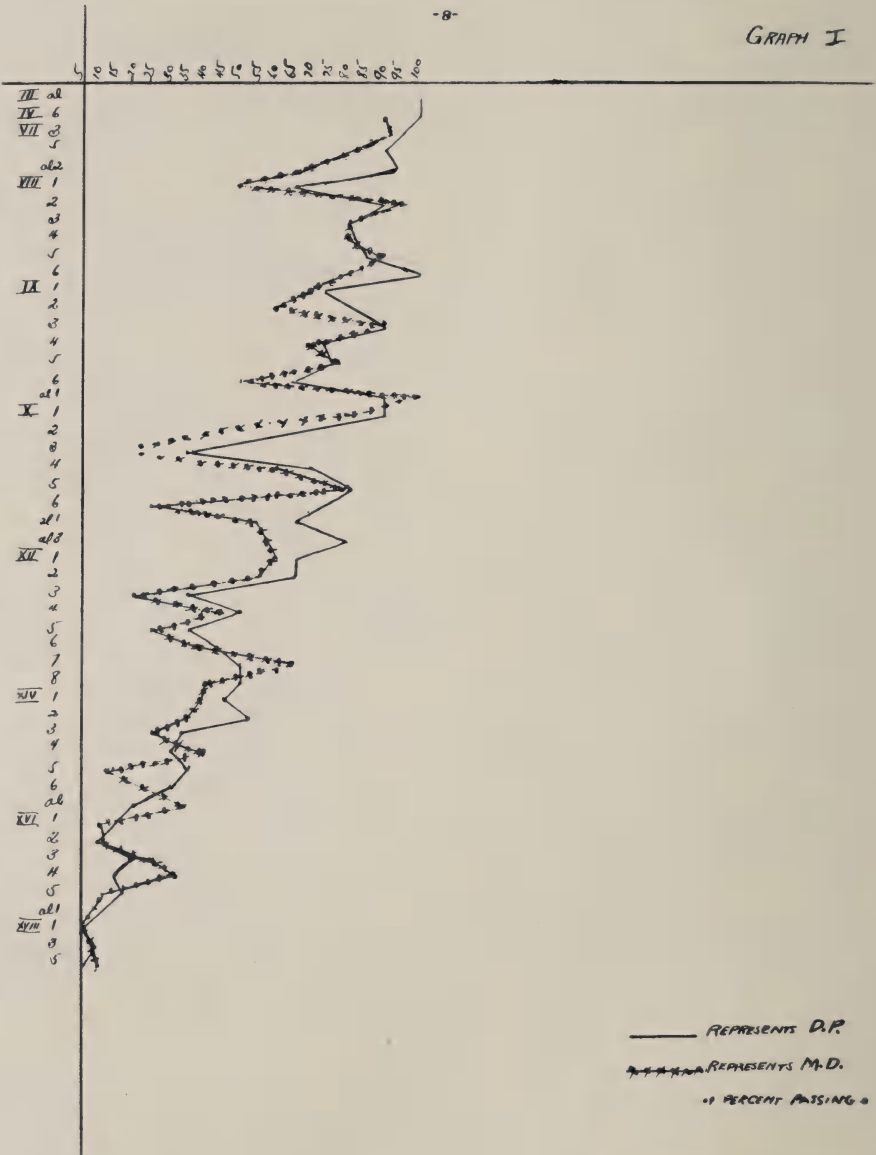
From these last results I selected those tests which make a minimum difference of fifteen per cent between the MD and DP records. These tests are:

VIII 1
IX 6
X 3
XII 3
XIV 2, 5 a1
XVI 4

I now set down the number of cases in the sub-groups passing and failing these six tests, and from them, worked out two graphs, one for each psychosis, showing the number of cases, plus and minus, contributed by each group.



GRAPH I. Showing percentages of manic depressive and dementia precox patients passing tests.



GRAPH II. Showing differences in percentage of manic depressive and dementia precox patients passing tests.

		MDM		MDD		MD Mixed		DPP		DPH		DPS		DPC	
		+	-	+	-	+	-	+	-	+	-	+	-	+	-
VIII	1.....	2	6	3	3	4	4	7	5	6	4	3	3	2	0
IX	6.....	2	6	2	1	8	2	8	7	7	4	3	1	1	0
X	3.....	1	11	2	6	0	10	12	19	7	11	4	9	0	2
XII	3.....	0	11	5	6	2	9	15	13	2	15	6	9	0	2
XIV	2.....	4	4	3	5	1	3	16	7	6	5	5	8	0	2
	5.....	3	6	3	9	1	9	11	18	7	7	3	11	0	2
	a1.....	0	6	6	4	3	7	7	22	2	13	5	10	0	1
XVI	4.....	2	5	4	5	2	6	5	16	28	0	1	9	0	0

		MDM	MDD	MDX	DPP	DPH	DPS	DPC
VIII	1.....	8	6	8	12	10	6	2
IX	6.....	8	4	10	15	11	4	1
X	3.....	12	8	10	31	18	13	2
XII	3.....	11	11	11	28	17	15	2
XIV	2.....	8	8	4	23	11	13	2
	5.....	9	12	10	29	14	14	2
	a1.....	6	10	10	29	15	15	1
XVI	4.....	7	9	8	21	28	10	0

We see now that here as well, the sub-group ratings follow one another fairly closely, or at least with few differences striking enough to exceed the Probable Error. Among the manic-depressive groups, the number of cases is too small in any case to afford significance in the results. Among the dementia precox, the catatonics can be omitted at once for the same reason. With the three remaining groups, DDP, DPS, and DPH, two differences that perhaps may hold true for a larger number of cases, may be distinguished.

If we take the fourteenth year as the average intelligence level of the country, basing our assumption on the results of the Army Intelligence Tests, we find the normal chance of success in a XIV year test is 60-75 per cent. Comparing the DPP rating for XIV 2, we find it slightly higher at 70 per cent. At any rate it is as high.

Our conclusions are twofold. In the first place we have the similarity just indicated between the DPP groups and average normal intelligence for XIV 2. Secondly, we have the difference analyzed above between the large MD and DP groups in Tests VIII 1, IX 6, XII 3, XIV 2, 5, a1, XVI 4. In general we may say that the ratings here analyzed show similarity rather than contrast between these two psychotic groups.

Such are the results obtained by the orthodox, empirical methods of psychology. The greater the number of cases, and the further removed they are from the individual life history, the more preferable are the results to the academicians of our Departments of Psychology. There is arising, however, with accelerating, tidal force, another empirical method. The new method discards the petty arrogance of the old, with its confidence that, without reckoning in the habits,

cratic method, wandering endlessly on a labyrinthine periphery, like a centrifugal force fundamentally opposed to the centripetal momentum that carries to the very heart. I think of Alice listening to the White Knight's tale of the old man, a-sitting on the gate.

"I'll tell thee everything I can:
 There's little to relate.
 I saw an aged, aged man,
 A-sitting on a gate.
 'Who are you, aged man?' I said,
 'And how is it you live?'
 And his answer trickled through my head,
 Like water through a sieve.
 "He said, 'I look for butterflies
 That sleep among the wheat:
 I make them into mutton-pies,
 And sell them on the street.
 I sell them unto men,' he said,
 'Who sail on stormy seas;
 And that's the way I get my bread—
 A trifle, if you please.'"

SOCIETY PROCEEDINGS

CHICAGO NEUROLOGICAL SOCIETY

HELD OCTOBER 30, 1924¹

EXPERIMENTAL AND CLINICAL EXPERIENCES WITH SYMPATHECTOMY IN SPASTIC PARALYSIS

ALLEN B. KANAVEL, LEWIS J. POLLOCK and LOYAL E. DAVIS

The relation of the sympathetic nervous system to muscle tone has been investigated from experimental and clinical standpoints. Employing silver impregnation stains, several investigators have shown the presence of nonmyelinated fibers, independent of medullated fibers, which ended in characteristic rings, loops, and nets, either within the sarcoplasm of a typical end plate or as small independent end plates in striated muscles. These fibers are described as arising from the thoracolumbar division of the sympathetic system. Assuming that such fibers are present in skeletal muscle, the latter then appear to have a dual innervation from the cerebrospinal and from the sympathetic nervous system.

Two lines of experimental investigation have been followed to determine the effect of removal of the sympathetic system on muscle tonus. First, the sympathetic innervation to an extremity of a normal animal has been removed, and the reflexes, active and passive motion and posture of the limb have been subsequently studied. Second, the effect of sympathectomy on the maintenance and onset of decerebrate rigidity has been investigated. The evidence with reference to the effect of sympathectomy on tone in a normal extremity is equally divided *pro* and *con*. All investigators have been agreed that sympathectomy has no effect on the onset or maintenance of decerebrate rigidity.

With the question in this situation, Royle and Hunter reinvestigated the problem experimentally and clinically. Their hypothesis was that: (1) Striated muscle has a dual innervation; (2) muscle tonus may be divided, as Sherrington and Langelan have stated, into contractile and plastic tone, and (3) the sympathetic system subserves plastic tone. They have sectioned the anterior roots in fowl and have found left a certain posture in the corresponding wing which has later been lost by doing a sympathectomy and which they stated was due to the removal of plastic tone. They have also removed the sympathetic trunk in goats, and after a period sufficient for degeneration to

¹ With Chicago Orthopedic, Surgical and Institute of Medicine Societies.

occur have produced decerebrate rigidity. They believe that such a procedure does not affect the onset but does alter the maintenance of decerebrate rigidity. They have operated in many cases of spasticity in man and have removed the sympathetic rami to the spinal nerves. They have reported immediate relaxation of the muscular rigidity. They believe that those cases of spasticity which show increased plastic tone, as evidenced by "hung-up" reflexes and shortening and lengthening reactions, are alone suitable for sympathetic ramisectomy.

We set out to investigate the effect of sympathectomy on muscle tone and to determine what clinical cases, if any, would be benefited by removal of the sympathetic supply. We removed the cervical or abdominal sympathetic trunk from sixteen cats and observed them from two weeks to sixty-three days. Cats have been the animals on which all studies of tone have been made in the past. After periods of time varying as stated above, these animals were decerebrated by the Pollock-Davis method. This consists of ligating the basilar and common carotid arteries. It has many advantages over the older guillotine method in that the level of section is more accurate; the animals may be studied longer and there is less shock, and therefore the usual reflexes are present immediately. We were wholly unable in studying reflexes, gait, and active and passive motion, both by motion picture records and by direct observation, to find any effect on normal muscle tone or to observe any effect on the onset or maintenance of decerebrate rigidity.

Clinically, we chose various types of increased muscle tone to study. We chose (1) that due to paralysis agitans of both the post-encephalitic and true types; (2) that due to a degenerative spinal cord lesion, such as lateral sclerosis; (3) that due to a hemiplegia with aphasia, produced by a cortical vascular lesion, and (4) that due to Little's disease. All the patients operated on were quite intelligent and mentally fit. The patients' active and passive muscle movements, tendon reflexes, tremors, direct myotatic irritability and electrical responses were studied by kymographic tracings and electromyographic tracings before and after operation. The gaits, range of motion, and resistance to passive movements were recorded both by clinical notes and by motion pictures before and after operation. Gastro-intestinal roentgen-ray studies were made before and after operation to determine the effect of removal of the sympathetic trunk on the movements of the intestinal tract.

Tone is a property of muscle, the components of which are to-day incompletely known and the physiology of which is poorly understood. There is at present no accurate physiologic method of measuring an increase or decrease in muscle tone. We believe that perhaps four mechanisms may be generally accepted as concerned in hypertonicity: (1) the corticospinal tract; (2) the extrapyramidal system represented largely by the striate body; (3) the brain-stem mechanism, and (4) cerebellar contraction. We believe it highly impossible that any single reflex arc or system mediates all these functions.

We were unable to affect the rigidity or tremor of paralysis agitans

of either type, and it is emphasized that paralysis agitans is an example *par excellence* of increased plastic tone. We were unable to affect the rigidity of lateral sclerosis. We obtained some slight result in one case of cerebral hemiplegia, and to date no demonstrable results in our cases of Little's disease. We removed the cervical and abdominal sympathetic trunks as indicated, of course thereby sectioning all of the rami communicantes. Our abdominal sympathectomies were done by the approach described by Royle and through a midline abdominal incision. We conclude that there may be some effect of sympathectomy on muscle tone probably through a vasomotor or chemical change, but at present there is no method of measuring that result either clinically or in the physiologic laboratory, and the problem should revert again to the physiologist to find a way of accurately measuring changes in muscle tonus.

Dr. E. W. Ryerson: The tone of the discussion has been rather unfriendly to the operation. It is greatly to be deplored that this operation was broadcast much too early, before definite observations could be made. I am not exactly convinced that it has been demonstrated that this is not a useful operation. It is unfortunate that the authors did not delineate the indications a little more accurately. Many of these experimental and actual operations were done on patients who were definitely denied the operation by Drs. Royle and Hunter. Paralysis agitans, they stated even before they got here, was entirely unimproved by this operative procedure. The answer was that they are so few in number and the class of cases to be benefited so extremely small, that the operation has a limited amount of interest for the practitioner. Mention has been made of various other operations that have been used with little success. Most of the operative work that has been successful has been the lengthening of tendons. Lengthening of tendons in these cases produces a definite benefit, and almost any type of operation produces a distinct benefit for the reason given by one of the speakers. The patients want to do better, and do improve after almost any kind of operative treatment. Dr. Royle operated in three cases at St. Luke's. One of the patients was one on whom I had performed several tendon lengthening operations previously. The condition that resulted after these operations undoubtedly militated against the success of Dr. Royle's operation, because a similar patient operated on the same day, with an almost identical condition of the hand, was much benefited. That was the case I saw two days after operation. This girl could supinate the hand. Dr. Davis pointed out that the child could not supinate the hand. Unless these contractures are relieved, it is useless to do the sympathectomy operation. I believe that in properly selected cases—judging from the few I have seen, only three or four in number, and there have been at least a dozen done by Royle here, there is a future in this operation. It is not difficult. It must be pointed out also that the method of approach in the surgical operation by Drs. Davis and Kanavel was not the same as the approach Dr. Royle uses. The

abdominal operation by Kanavel and Davis is not identical with the operation employed by Royle. The operators in this city have taken out the entire sympathetic cord, as I understand it. Dr. Royle does not. He simply cuts the small rami.

Dr. Philip Lewin: During Dr. Royle's stay here he operated in twelve cases. Seven patients were referred to him by me, and I assisted in the operation of five. Before operation I examined eight or ten, and since operation I have seen ten of the patients. The two that he operated on for Dr. Parker at the Home for Destitute and Crippled Children I saw with Dr. Royle two days later. They were both definitely improved. What I propose to tell is observations that I do not expect to be able to explain. These two patients were both definitely benefited in that all vasomotor tone of the limbs on the side operated on was much improved. The limbs were warmer and dryer. When we asked these children to perform what I call the triple movement test actively and passively, that is, actively flexing and extending the limb three times in succession—or you can do it ten times if you want to—and then do the other leg, both actively and passively, I was convinced that the limbs which were operated on, which, previous to the operation, were the worst limbs, were much less rigid. The child moved them more easily himself, and I moved them more easily. Now, Royle selected the worst limb in every case, if it was a bilateral affair. He said to me that if the worst limb is operated on each time, the next day it will be found to be the better limb. So far as I have observed since, I believe that is true. The reflexes were not greatly altered in those two cases. We went from there to Wesley Hospital and saw two patients that Dr. Royle had operated on about four days before, but did not see much change in them. These two cases were thrown on the screen to-night by Dr. Davis and to me it looks as though they have improved a whole lot. The physicians expect too much from the operation and the people expect too darned much. If it removes a certain block that is present and allows the physician to reëducate the patient or give them what Royle calls neuromuscular education or neuromuscular reëducation, and allow that to be carried on at a greater rate, I think it is well worth while. All these patients are enthusiastic or else they would not allow the operation. Therefore, they are enthusiastic in saying they are better. I cannot explain it and I do not know of any one else who can; but I believe that the operation is going to do a lot of good in ways that might never be explained.

Dr. A. J. Carlson: I have had no experience with these cases that have been reported here, but I have some knowledge of the supposed physiologic agents. It is very easy to put up a straw man and then make a great hullabaloo to knock him down. And while it is probable and possible that these various types of spasticities may not easily be paralleled on the experimental animal, yet it seems to me that until we have been able to show that the efferent sympathetics have any influence whatever on skeletal muscles, we really have no ground to stand on. Every critical experiment undertaken by a critical physi-

ologist is absolutely negative. Of course, there is the possibility of changes in muscle tone following changes in the circulation. If you remove the large sympathetic trunk you may get an effect on the reflex centers. I have seen, for example, in frogs with complete cross-section of the cord that we have had now for four years, that stimulation of the large bowel will put the legs in rigidity which will last from ten to fifteen minutes. We have added evidence from all kinds of animals that the visceral afferents may, and in some cases do, increase the reflex mechanism of the skeletal musculature. That, of course, would be an entirely different affair from a direct cutting off of the sympathetic tone. I am afraid that we physiologists have partly to take the blame for this excursion of the surgeons because of the suggestion by the physiologic experiment that cutting these nerves diminishes tone. Whether they have a scientific mind or not, as Dr. Ryerson brought out, if they had examined all the physiologic evidence I do not believe they would have taken the step.

Dr. Ernest Sachs, St. Louis: I have read Dr. Royle's papers and read the reviews in some of the English journals, particularly one by Dr. Walshe, which is favorable. I felt that the work was not convincing. I have been tremendously impressed by the very careful and accurate methods that Drs. Kanavel, Davis, and Pollock have employed in studying these cases, and in trying to find out experimentally first whether there was a sound basis for undertaking these operations. I am going back with a very definite impression that the question is distinctly not proven.

Dr. Allen B. Kanavel: Dr. Ryerson did not hear Dr. Davis say that we not only had operated on these patients by abdominal sympathectomy and removal of the cervical, but also did all four types of operation in these patients.—*J. A. M. A.*, Nov. 15, 1924.

CURRENT LITERATURE

I. VEGETATIVE NEUROLOGY: THE NEUROLOGY OF METABOLISM.

1. VEGETATIVE NERVOUS SYSTEM.

Bard, L. PHYSIOLOGY OF THE SYMPATHETIC NERVOUS SYSTEM. [Ann. de Médecine, June, 1922, p. 453.]

In this thoughtful paper the author calls attention to the fact that in the last twenty years the general and pathological physiology of the peripheral receptors and centripetal tracts of the sympathetic system has been grossly neglected. Even the existence of centripetal tracts is contested and Langley's false views in this respect too widely distributed. He refers to the theory of the antagonistic action of the pneumogastric and the sympathetic, and describes the further division of the latter system into two parts—"great sympathetic" and "parasympathetic." The functional antagonism between these divisions is the *leitmotiv* of this theory; the experimental control of their varying reactions to various drugs has become the basic principle of this study. Bard regards the "parasympathetic" as occupying an intermediate position; the "great sympathetic" belongs exclusively to "the life of nutrition," while the parasympathetic appears to be a connecting link with the "life of relation," controlled by the pneumogastric. Gaskell regarded these two divisions of the sympathetic as having different embryonic origins, and Guillaume believes that the connections between the endocrine glands and the sympathetic system constitute a true morpho-physiological unity. Bard lays down certain theses: "Varying stimuli demand appropriate receptive mechanisms"—hence there is a sympathetic reflex mechanism regulating trophic function, analogous to that of the cerebrospinal system. "The functions of 'the life of nutrition' fall into three groups, clearly distinct in all details of their biological mechanism." These groups are: (1) muscular apparatus in order to obtain and assimilate all materials necessary to metabolism, (2) secretory apparatus of every kind, and (3) mechanism controlling metabolism. These three groups have a "pendulum-like function—that is, alternation in two phases," each complementary to the other. He illustrates this by reference to accepted physiological phenomena—for example, respiration, peristalsis, gland secretion, etc. Bard's next thesis is: "Alternation of phases results in oscillations around a position of rest." This double action requires receiving apparatus for the stimuli which are the source of all reflex action. The peripheral receptors of stimuli can.

only exist in the interiors of organs; he cites as example the bundle of His and Auerbach's and Meissner's plexuses, the former being the more complex; but recent researches (Ramón y Cajal and Dogiel) have thrown some light on their structure. Bard concludes that the various nerve elements can furnish a complete reflex arc and illustrates this by the analogy of a vascular reflex, "which should be constrictor or dilator, as the impression which evokes it demands increased flow or restriction of the blood stream." Many other illustrations from the physiology of the central nervous system are given. Bard remarks that the intervention of the sympathetic, which plays a leading part in the production of morbid phenomena, shows itself chiefly by anomalies of reflex action, and concludes by referring to various drugs which exercise a powerful influence on the sympathetic—atropin, eserin, adrenalin, etc.—and especially on the contrasted action of digitalis and of quinidin. These few examples, collected from cardiac therapeutics, explain the importance of the preceding principles and the new aspect given to the greater part of therapeutic problems pertaining to symptomatic medication.

Maranon, G., and Carrasco, E. BASAL METABOLISM. [Cen. d. Méd., February, 1923; J. A. M. A.]

Marañón and Carrasco find a distinct diagnostic and prognostic value in determination of basal metabolism only in affections of the thyroid. It usually allows the differentiation of them from pathologic states grouped under the heading of "pseudohyperthyroid vegetative neuroses." Sex glands and the pituitary act in the same sense as the thyroid. If the disturbances of their function are associated with hypothyroidism or hyperthyroidism, the influence of the thyroid changes prevails, even if the other glands are affected in the opposite sense.

Brüning, F. TROPHIC FUNCTIONS OF THE VEGETATIVE NERVES. [Kl. Woch., 1923, No. 2.]

The author adds another case which shows that the influence of tonus (lowering) through sympathectomy (periarterial) can be brought about not only peripherally but also centrally. Removal or extensive lowering of sympaticotonus will not only bring about recovery from trophic disturbances like abscesses but it can also effect an hypertrophy.

Aub, J. C., Forman, J., and Bright, E. M. SOME EFFECTS OF SUPRARENALECTOMY ON TOTAL METABOLISM OF CAT. [American Journal of Physiology, July, 1922, Vol. LXI, No. 2, p. 326.]

Forty-eight hours after the removal of both suprarenal glands in the cat, Aub *et al* found a reduction of about 25 per cent in the total metabolism without marked change in the relative percentages of foodstuffs burned. Control experiments on completely fasting and operated cats show a fall in metabolism less than half the magnitude of that seen after suprarenalectomy. Removal of one suprarenal causes a temporary fall,

but a return to normal metabolism. Denervation of the remaining suprarenal is followed by a slow fall of the metabolic rate. The theory is suggested that whereas the thyroid is the slowly acting regulator of the metabolic mechanism, some quick changes of short duration may be controlled by variations in the secretion of the suprarenals.

Boothby, W. M., and Sandiford, I. BASAL METABOLISM STANDARDS. [Jl. of Biol. Chem., December, 1922, LIV, No. 4; J. A. M. A.]

The data presented by Boothby and Sandiford are evidence to the effect that the basal metabolic rate differentiates diseases into those with increased, normal, and decreased metabolism as sharply as the temperature divides diseases into the febrile and afebrile groups. The two points especially emphasized are: first, that a high percentage of persons have a basal metabolic rate within ± 10 per cent and a very high percentage within ± 15 per cent of the Du Bois standards for age and sex for each square meter of body surface, provided the subjects have no definite disease that is characterized by a pathologic alteration in the rate of heat production; and second, that in a smaller percentage of these same subjects the basal metabolic rate is within the same limits when the Harris and Benedict standards are used.

Charles. NEUROPATHIC KERATITIS. [Amer. Journ. Ophthalmology, September, 1922, Vol. V, No. 9.]

The author calls attention to his original contention in 1904 that the dendritic keratitides, whether herpetic or papular as in malarial keratitis, were the results of terminal nerve lesions: because of the accompanying corneal anesthesia; the shape of the lesion, especially at the beginning; the advancement of the ulcer by new infiltrations as if along the branching of a nerve; and also the extreme chronicity of the disease and the fact that it is seen only after those diseases which, when they affect the nervous system, affect the terminal nerves rather than the central nervous system, *e.g.*, malaria, grippe, pneumonia. Drawings were produced of the superficial subepithelial plexus from a dog's cornea. When tracing paper had been placed over these drawings and fine lines and dots replaced the nerves and their triangular branchings, pictures very similar to dendritic keratitis were obtained. Two cases were mentioned which had resisted all other measures for relief but almost immediately recovered under the treatment of nasal sinus disease. The author believes that the most probable cause of the keratitis in these cases was focal infection from a paranasal sinus. [Author's abstract.]

Shawkey, Arthur A. ATROPIN AND THE HYPERTONIC INFANT. [Annual Meeting of the West Virginia State Medical Association, Huntington, W. Va., May, 1922.]

The author considers hypersensitiveness or hypertonicity in infancy to be a definite disease entity, widely studied in its more marked form,

pylorospasm, but little considered in its less marked spasms of other portions of the alimentary tract. The relation of pylorospasm to pyloric stenosis is mentioned but not discussed. Discussion is limited to the less commonly recognized demonstrations of hypertonicity and to treatment by atropin. The continuation of exaggerated peristaltic waves through the entire alimentary tract, independent of the passage of food through pylorus, is noted. The apparent constipation is due to over-contraction of the anal sphincter. It is not a true constipation, as the stools are always small and soft, or semiliquid.

Attention is called to the overactivity of these infants and the character and amount of their crying, which, after the failure of anticolic and carminative remedies, leads to the error of weaning from the mother's breast. The relation between hypertonicity in infancy and enuresis in childhood is noted. Atropine sulphate is recommended as a safe drug, having a soothing and quieting effect upon the reflex nervous system and as the treatment of choice for these cases. Very small doses in the beginning are urged—.001 grain, or half that amount in very young infants, increasing the dose gradually. The necessity of differentiation from cases of allergic reaction of the breast-fed baby to some protein or proteins in the mother's diet is stressed. This class of cases is larger than generally supposed. Several illustrative cases are reported. [Author's abstract.]

Henderson, V. E. SENSITIVITY OF DIFFERENT NERVE ENDINGS TO ATROPIN. [Jl. of Pharm. & Exp. Ther., March, 1923.]

The ordinary textbook on pharmacology is apt to mislead the physician by stating that atropin paralyzes the endings of the bulbo sacral autonomic outflow (parasympathetic), and thus the reader is led to expect that therapeutic doses will depress the vagus and make the heart go faster, and also dry the mouth and skin, decrease the movements of the gut and the urinary bladder, etc. That in pharmacopoeial doses it has not these actions is also well known. For example, such doses slow the heart (Platz), and that 1/30 gr.-1/10 gr. is necessary to abolish vagus control has been shown by Lewis. Bayliss and Starling, Cushny, and Edmunds have shown that atropin in large doses, 30 mgm. to a dog, does not prevent stimulation of the vagus increasing the movements of the intestine or bladder. Consequently a study of the relative effect of these drugs on the various nerve endings was attempted. By results of these experiments Henderson showed that: (1) The endings of the bulbo sacral autonomic outflow are rendered ineffective by atropin in the following order: cardiac vagus, chorda secretor, chorda vasodilator, intestinal vagus, bladder. The latter is not affected. (2) The endings are depressed in the following order: nasal, chorda secretory, cardiac vagus, tonus of pyloric sphincter, and small intestine, bladder, oculomotor to pupil, salivary vasodilator, vagus to intestine for rhythmic and peristaltic

mövements. The tonus of the gut and of the urinary bladder (Henderson) and probably of gall ducts and ureter is lowered by pharmacopoeial doses. [Author's abstract.]

Fleisch, A. BLOOD SUPPLY OF ORGANS. [Schweiz. med. Woch., June 8, 1922, Vol. LII, No. 23, p. 581.]

Fleisch has devised a method for estimating the blood supply to different organs at work and at rest. With this he has determined that the acid products generated by the work of the tissues possess a vessel-dilating action. The blood supply is thus increased proportional to the amount of metabolic waste products formed. "Every organ, every segment of tissue receives exactly the amount of blood it requires for the work it is doing at the moment." The intensity of the dilatation of the vessels is a direct function of the amount of hydrogen ions. [J. A. M. A.]

Shannon, W. Ray. NEUROPATHIC MANIFESTATIONS IN INFANTS AND CHILDREN AS A RESULT OF ANAPHYLACTIC REACTIONS TO FOODS CONTAINED IN THEIR DIETARY. [Amer. Jour. of Dis. of Children, July, 1922, Vol. XXIV, pp. 89-94.]

The well-known frequent association of the neuropathic and exudative diatheses in the same individual suggested to Shannon that there might be a causal relationship. This was supported by the observation that in the same individual sometimes the symptoms of one and then again of the other diathesis would predominate without determinable explanation. Furthermore it was not unusual to find that neuropathic individuals presented a history of exudative phenomena at a previous time. In the light of more recent opinion that probably a majority of the symptoms of exudative diathesis are a result of anaphylactic reactions to foods contained in the dietary of the patient, it seemed probable that the symptoms of the neuropathic diathesis might also result from the same cause. This conception was further strengthened by the observation that known anaphylactic conditions, such as asthma, eczema, and urticaria, are so frequently accompanied by marked nervousness, by the fact that the drugs which relieve these conditions are notably drugs which act on the nervous system, and by the knowledge that anaphylaxis as seen in the experimental animal is fundamentally a nervous phenomenon. Consequently eight cases showing marked evidence of the neuropathic diathesis in infants and children were studied. In four of these definite evidence of the exudative diathesis was also present, while in still another there was a definite history of such a condition in the past. The remaining three gave no evidence suggestive of the presence of an exudative diathesis. All of the patients showed the presence of protein sensitization by cutaneous tests. All showed definite relief from the nervous symptoms on the institution of specific therapy directed at the proteins to which they were sensitive. In one case the nervousness could be relieved or brought on by the omission from or the addition to the diet of the patient of the food

to which the individual was sensitive. As a result of this work the author raises the question whether there is any limit within the field of the so-called functional nervous diseases beyond which such a cause could not be operative. He concludes that many of the symptoms of the neuro-pathic diathesis in infants and children are not infrequently the result of irritation of the nervous system resulting from anaphylactic reactions to food proteins to which the patient has become sensitized. [Author's abstract.]

Arrillaga, F. C. SENSORY VISCERAL REFLEXES. [Revista de la Assoc. Méd. Argentina, January to April, 1922, Vol. XXXV, Nos. 207-210, p. 63; J. A. M. A.]

Arrillaga refers to reflexes for which some chronic visceral lesion is responsible. One young woman, for example, presented neuralgia of the eleventh dorsal nerve with an intensely tender point at the McBurney point; lightly pinching a fold in the abdominal wall caused pain in the appendix region and also along a line between the axillary line from the costal arch to the ilium. He attributes the sensory reflex to some torpid lesion in the right ovary, and proposes to treat the girl of eighteen with ovarian extract plus treatment of her inherited syphilis. If this does not cure, he will block the nerve with alcohol. In a similar case in a woman of forty-seven, his presumptive diagnosis was confirmed by the transient cure from injection of procain to deaden this eleventh dorsal nerve. Appendicectomy in both these cases had had no influence on the neuralgia. When appendicitis is responsible for the sensory reflex, the pains are more paroxysmal, while with a lesion in the adnexa they are persisting, and there may be exacerbation during the menstrual periods. With lesions in the urinary apparatus there may be similar neuralgia of the eleventh dorsal, but it usually extends to the first lumbar, and the urine clears up the diagnosis. The prostate may also induce this eleventh dorsal neuralgia, but it is usually bilateral in this case. With chronic lesions of the testicle, the tender points are generally lower. There is a specially tender point, with the eleventh dorsal neuralgia, in the next to the last intercostal space close to the spine. Further testimony to the neuralgic character of the pain is its disappearance after injection of a little procain at any of the tender points.

Van Leeuwen, Bien, and Varekamp. DIAGNOSIS OF ANAPHYLACTIC NATURE OF DISEASES. [Ned. Tijd. v. Genees., November 18, 1922, II, No. 21.]

In a series of forty-nine asthma patients tested percutaneously by these experimenters, 67 per cent responded positively to horse scales; dog hairs and rabbit hairs gave positive reactions in 53 and 39 per cent, respectively. They conclude that the hypersensitivity was not specific but was to skin in general. Ninety-five per cent of asthma cases retested to skin in general gave positive reactions. They call attention to this as a

simple, harmless, and instructive means for detecting those whose asthma, migraine, epilepsy, etc., may be assumed to be related in any way to foreign substances. The test extract is made with dandruff scales, ground with ether. After evaporation of the ether, the scales are extracted by ten volumes of a solution containing 0.5 per cent sodium chlorid and 0.4 per cent sodium bicarbonate for two days under toluol. The extract is preserved with 0.5 per cent phenol. Intracutaneous injection of salt solution containing 0.5 per cent phenol serves as a control. Some extracts contain toxic substances and must be discarded. The average individual they report as reacting negatively, "which is not in accord with a number of other experimenters who find very irregular reactions on the part of nearly all individuals." [Ed.] They urge dermatologists and neurologists to apply this test extensively in skin diseases, epilepsy, etc. By its use cases can be detected in which desensitization may cure the disturbances. Tuberculin or parenteral injection of milk may accomplish the purpose. With the possible exception of hay-fever, it will probably be rarely necessary to resort to the specific protein involved.

Albertoni, P. THERMIC CHANGES AND TROPHIC LESIONS IN MORBID PROCESSES. [Policlinico, 1921.]

The author employs the method of Blix and v. Frey to study Raynaud's disease as the subject of his first investigation in the determination of the relation between thermic changes and trophic lesions. He finds in a number of cases distinct lesion of the thermic points in the hands, that is, diminution of the points for cold and for heat, alterations more or less extensive and important according to the case and the gravity of the disease. The diminution and the disappearance of the thermic points are found even where the skin has normal characteristics, and one cannot therefore merely speak of a secondary effect. Areas are found in the fingers with the tactile sensibility well preserved but with complete absence of the thermic points. The thermic nerves, according to the author, are necessarily even trophic nerves because one can understand the capacity which man has for maintaining the proper temperature generally and in the individual parts only by understanding the capacity which the nervous system possesses of exciting biochemical processes which may be referred to the production of heat. The mechanism must be more active where it has to do with a part like the hand, constantly exposed to marked changes of temperature, especially in some classes of individuals. That the local biochemical processes are even to a certain extent independent is proved by the fact that, *e.g.*, in poliomyelitis, the temperature of the paralyzed limb is even much lower than that of the healthy limb, and that the paralyzed limb exposed to excessive cold acquires again the original temperature only very slowly in comparison with the sound limb. It may be considered as proved that the fibers which have relation to the nutritive functions of the tissues are identical or associated with those which transmit the thermic sensations. In those

individuals who are subject to the disorder in its different degrees it may be doubted that there is a congenital defect of the thermic sense, a sense which, according to Preyer's observations, is not yet developed in the newborn but finds its organization little by little. The author promises further material upon the subject in another communication. [Author's abstract.]

Brown, W. Langdon. PATHOLOGY OF THE SYMPATHETIC. [Encéphale, October, 1922, XVII, No. 8; J. A. M. A.]

Brown emphasizes the essentially defensive rôle of the sympathetic nervous system. It sends the flood of energy toward the exterior, while the parasympathetic nervous system sends it inward. The sympathetic functions in the plane of the subconscious. Pain, fear, and anger are the special stimuli which rouse it to action, and when the adequate motor reaction is prevented or restrained, the preparations for defense are thus diverted from their natural purpose and may display a pathologic character of perseveration or dissociation. The restraints of civilization are liable to entail this perversion of a primary defensive mechanism, and this, he reiterates, is the key to the general pathology of the sympathetic nervous system. Among the instances he cites are the almost epidemic appearance of hyperthyroidism after the San Francisco earthquake, after the massacres at Kishineff, and during the period of airplane bombing of London. He adds that as the sympathetic is the intermediary between the skin and the endocrine glands and the brain, this explains how the effect of climate on the skin can modify brain functioning. Certain associations of ideas can act on the autonomic nervous system independently of the will. Hence if we can realize this association of ideas voluntarily, the same autonomic reactions may follow.

Fröhlich, A., and Meyer, H. H. VISCERAL SENSIBILITY. [Klinische Wochenschrift, July, 1922; Aust. M. J.]

Fröhlich and Meyer have investigated the paths of the nervous impulses associated with visceral sensibility. The impulses may travel by way of the afferent spinal nerves, that is, through the posterior roots, or through special sympathetic sensory paths by way of the anterior spinal nerve roots. The authors have been able to establish that in the dog the fibers mediating pain-sensitiveness for the bladder, rectum, distal and proximal colon, small intestine, as well as for the arteries of the limbs, enter the spinal cord through the posterior roots. They are of a nature similar to spinal nerve fibers which are undoubtedly mingled with the vegetative nerves in their passage from the end-organs right up to their entrance into the spinal cord and which cannot be anatomically separated from them. The anterior roots are not concerned in the pain path. The pain-sensations from the bladder pass by way of the pelvic nerves to the posterior sacral roots, from the intestines by the splanchnic nerves and the hypogastric nerve chiefly to the posterior thoracic roots. As adequate

stimuli for pain sensation in the hollow viscera, dilatation and cramp-like contractions must be considered. For the occurrence of colicky pain a fixation of the loops of intestine and a resultant dragging of the whole mesentery and its attachments are unnecessary. For the pain resulting from dilatation a stretching of the attachments of the mesentery seems necessary, though only in a small area and close to the intestinal wall. Colicky pain resulting from contractions can occur without any dragging of the mesentery.

Daniélopou, D., Radovici, A., and Carniol, A. VISCERO-MOTOR AND OTHER REFLEXES. [Rev. Neur., March, 1922.]

D. Daniélopou, A. Radovici, and A. Carniol record their study of the reflexes in a patient suffering from paraplegia due to transverse myelitis at about the ninth thoracic segment. The patient had an "automatic bladder" and, as is common in such instances, rubbing the skin of the hypogastrium induced micturition. A more interesting fact was that micturition was followed by involuntary automatic movements of the lower limbs. This observation led to the following experiment: Upon a sound a rubber bag was let into the bladder and connections were so arranged that the bladder could be artificially distended and its movements recorded on an ordinary tambour. With a similar apparatus movements of the colon could be observed. (1) Simple distension of the bladder induced vigorous contraction. (2) Pricking or pinching the skin of any part below the level of the lesion also induced vesical contraction, whereas skin stimulation above the lesion produced no response. This was regarded as a true cutaneo-vesical reflex, whose course was to the spinal cord by way of posterior roots, thence to the bladder center in the sacral segments and on by parasympathetic fibers to the bladder. (3) Filling the bladder induced defense movements of the lower limbs and a sharp contraction of abdominal muscles (viscero-motor reflex of the bladder). (4) Distension of the colon induced movements of the limbs (viscero-motor reflex of the colon). (5) Pressure upon the eyeball, even if slight, was constantly followed by a desire to urinate (oculo-vesical reflex). (6) Pressure upon the eyeball also induced contractions of the colon (oculo-colic reflex) and contraction of voluntary muscles (oculo-viscero-motor reflex). The first section in the pathway for these ocular reflexes was in the pneumogastric nerve. [Aust. M. J.]

Bartrina, J. M. GENITO-URINARY REFLEX PHENOMENA. [Journal d'Urologie, May, 1922, Vol. XIII, No. 5, p. 337; J. A. M. A.]

Bartrina reported last year a case in which the abnormal position of one kidney checked the functioning of both kidneys, and the menacing uremia was cured only by removal of the misplaced kidney. But the other kidney is not the only organ that suffers from an inhibiting reflex starting in the urinary apparatus. The genital and the digestive apparatus may feel the effect, as also the other elements in the urinary system.

Among these reflexes, pain or tenesmus in the bladder early in renal tuberculosis is exceptionally instructive. Disturbances in the urethra and prostate are common with calculi in kidney or ureter. This "false urethritis" with unsuspected calculi in the kidney often proves misleading. There is pain or smarting in the urethra, and there may be secretion, but the gonococcus is not found. The ordinary bacterial flora may then set up inflammation, or the local treatment applied on a mistaken diagnosis may start it.

The neuralgic character of the pain stamps these reflex cases as a group apart. They persist refractory to treatment until the calculus ceases to give further trouble. Pain in kidney or urethra may be noted in gout, diabetes, phosphaturia, etc., probably from some old damage of the kidney with which it still has to contend. The kidney often suffers in the uric acid, oxalic acid, and other diatheses. There may be no symptoms in the kidney itself, but its intimate nervous connection with the genital apparatus may readily explain certain instances of impotency, spermatorrhea, and other functional disturbances, as of reflex origin. Intestinal disturbances traceable to reflex action from unsuspected kidney stones range from simple constipation to pseudo-occlusion and spasmodic pains. One of his patients with known kidney calculi sometimes had to take enemata a dozen times a day to relieve his returning colic. Another barely escaped a laparotomy for ileus by the discovery of a few erythrocytes in his urine. In all these bowel cases the complete cure followed the clearing out of the calculi from the kidney. Pain spreading from the bowel to the rectum and anus is particularly suggestive of a kidney calculus. Injection by the rectum of an anodyne relieves the pain with true kidney colic better than by ingestion or hypodermic.

Müller, E. F. LEUKOPENIA AS A REFLEX OF THE AUTONOMIC SYSTEM. [Münch. med. Woch., December 22, 1922, LXIX, No. 51.]

This investigator reports that *intracutaneous* injections of indifferent substances (including normal saline and even air) may bring about a leukopenia. Minimal amounts of epinephrin delays the reaction. The phenomenon seems to be a reflex due to stimulation of the vagus. The end point of the reflex lies in the vessels of the abdomen. Their dilatation causes slowing down of the blood stream and accumulation of leukocytes in the abdominal organs. Increased tonus of the sympathetic system prevents this leukopenia. Widal's hemoclastic crisis is interpreted as a vagus reflex. The cause is a change in the equilibrium between the parasympathetic and the sympathetic.

Daniélopou, D., Radovici, A., and Carniol, A. OCULOVISCEROCUTANEOUS MOTOR REFLEXES. [Revue Neurologique, XXXVIII, 1922, p. 249.]

The authors here set out to analyze the innervation of the viscera, and its reflex activities from the eyeballs, skin or elsewhere. Spinal cord tumor cases or other lesions shutting off the brain are specially adapted

for this type of investigation. One such paralyzed patient urinates four times a day and is continent. When he feels the necessity for voiding the bladder, he rubs the skin of the hypogastrium, and the urine flows at once. As the urine flows, the legs make involuntary movements. Spontaneous contraction of the legs is accompanied by a desire to urinate, as also compression of the eyeball. Six of these visceral motor reflexes could be elicited in this case. They could all be elicited faintly in normal subjects but were scarcely recognizable.

Wallis, R. L. M., and Nicol, W. D. VALUE OF PROTEIN HYPERSENSITIVITY TESTS. [Lancet, April 14, 1923.]

This study was carried on in epileptics. Five groups of proteins were used in the study: (1) Egg; (2) meat and fish; (3) milk of various animals; (4) vegetable proteins; (5) cereals. Tests were carried out on 122 epileptics. Of these, forty-six gave positive reactions to different proteins, while seventy-six did not react at all. The results of these observations have shown that in some cases in which it has been possible to adjust the diet on the basis of skin tests, no further treatment has been necessary. Peptone was given orally to twenty-four patients. In some cases the fits have become less frequent and, in a small proportion of cases, there has been some mental improvement as well. In two cases the peptone made the patients decidedly worse. The tests are said to serve as a guide not only to diagnosis, but also to treatment.

Sollmann, T. STUDIES OF CHRONIC INTOXICATION ON ALBINO RATS. VI. LEAD CARBONATE. [J. Pharmacol & Exper. Therap., XIX, 1922, p. 375, Med. Sc.]

The author gives a short summary of what is known with regard to lead poisoning in man and in animals. The amount necessary to produce intoxication in man is from 0.2 to 0.3 mgm. per kilo. The amount is much higher for animals. The experimental work was done on rats. Amounts from 0.0007 to 0.15 mgm. per kilo produced slight but definite check of growth and appetite. The mortality of these rats was high between 9 and 17 weeks, due probably to lowered resistance. The whole dose of lead in clinical human plumbism probably begins with one-fifth to one-third grain per kilo; but it is seen that much smaller doses are not harmless to rats, and it is pointed out that in cases of metallic poisoning there is probably a wide gap between the amounts which will produce definitely poisonous symptoms and those which are completely harmless.

Lowenstein, A. TO ENHANCE ACTION OF DRUGS ON NERVOUS SYSTEM. [Medizinische Klinik, Vol. XVIII, 1922, p. 924, J. A. M. A.]

The cerebrospinal fluid does not take up drugs out of the blood to any extent, and this is the reason why intravenous medication has so little effect in neurosyphilis. To force the fluid to take up more of the

drug Löwenstein advocates lumbar puncture at the same time as the intravenous injection of the drug. To enhance the effect still more, he suggests to blow air into the spinal canal. This induces a mild, brief meningitis from the irritation. In case of a tabetic affection of the optic nerve he would supplement this with direct local irritation of the eye. For this, a strong solution of sodium chlorid might be given in subconjunctival injection, with or without aspiration of the vitreous body. By these means for "biologic enrichment of the cerebrospinal fluid" we may be able to arrest incipient degeneration of the optic nerve and other similar manifestations of neurosyphilis.

Rabinovitch, I. M. BIOCHEMICAL STUDIES IN A FATAL CASE OF METHYL ALCOHOL POISONING. [Arch. Int. Med., XXIX, 1922, p. 820, Med. Sc.]

The patient died five days after drinking a glass of wood alcohol. The blood showed definite evidence of renal failure, a steady rise occurring in the uric acid, urea, and creatinin content. An increase in the reducing power of the blood was present, which might in part be attributed to the presence of formaldehyde, derived from the methyl alcohol, but which the author believes, in view of the work of Denis and Aldrich, was due to a true hyperglycemia. The CO_2 combining power of the plasma fell to 26 vols. per cent. It is suggested that this may have been due to the formation of methylene derivatives, strongly acid in reaction, by the action of formaldehyde on the amino acids present. Methyl alcohol was recovered from the tissues after death. The post-mortem examination showed parenchymatous nephritis, cloudy swelling of the heart and liver, and bronchopneumonia.

Gutiérrez. BLOCKING THE SPLANCHNIC NERVE. [Sem. Méd., June 29, 1922, I, p. 26, J. A. M. A.]

Gutiérrez' seventeen illustrations show the anatomy of the region and the technic for introducing the anesthetic. In the thirty cases in which he applied it, he used from 70 to 90 c.c. of the 0.5 per cent solution of procain on one side, and a total of 120 to 170 c.c. for bilateral blocking. He states that the anesthesia was ideal in 23 cases and good in 3, but in 4 it was not satisfactory. He advocates Roussiel's technic for operations on the stomach, and Kappis' for operations on the right side. If the top of the needle is kept in touch with the body of the vertebra, and if it is not pushed in for more than 11 cm., there need be no fear of injury to the aorta or cava.

Bryan, Beeler, Cathcard and Fitz. GLUCOSE TOLERANCE TEST. [Jl. Metab. Res., I, 1922, p. 549.]

These studies point to the fact that there was great variation in the absorption of glucose ingested for the purpose of determining tolerance. Administration of the glucose intravenously corrected this

error, but added to the complication of the procedure. The writers suggest, therefore, that the glucose be administered by mouth, as usual, and that at the end of an hour, the stomach should be completely emptied. The amount of glucose recovered in the stomach contents should be subtracted from the amount originally given and the amount absorbed per kilo body weight thus calculated. Interpretation of the resulting blood-sugar curve may then be based upon a knowledge of the approximate amount of glucose which was able to influence that curve. Other factors of error, such as variation in the speed of absorption from the small intestine and increase of blood volume by absorption of fluid may be safely disregarded.

Baastrup, C. I. CALCIUM TREATMENT OF NERVOUS HEADACHE. [Uges. f. Laeg., Feb. 1, 1923, LXXXV, No. 5. J. A. M. A.]

Baastrup reports experiences which justify tentative calcium treatment in all cases of rebellious headache for which no special cause can be discovered. In some patients in this class a tendency to recurring attacks of Quincke's edema suggested that the headache might be due to the intracranial extension of the process, and that calcium would be the logical treatment. A familial predisposition was always evident in this group. The recurring attacks and puffiness under the eyes, swelling of the lips and other manifestations of Quincke's edema were accompanied by the severe headache. The portrait of the grandfather of one of these patients showed the same puffiness under the eyes. Baastrup gave calcium lactate, 1 gm. one to three times a day for three weeks, and then with longer intervals for ten days. The results were excellent. The edema and the headache subsided, as also a vasomotor rhinitis which had proved refractory for several years. In other cases absolutely no cause could be discovered for the "nervous headache," but the calcium tablets proved equally effectual. The children in these families were usually of the exudative diathesis type. The blood may show a lymphatic tendency in cases of nervous headache, and this is a further indication for calcium treatment.

Loper, J. A. ABDOMINAL SYMPATHETIC SYNDROME AND ITS TREATMENT WITH ADRENALIN IN THE MILITARY SERVICE. [Author's Abstract.]

Clinical observation within the military service in Argentina has taught a series of symptoms which even if they did not incapacitate for service constituted disturbances which somewhat interfered with training. These are manifestations in the digestive apparatus, although we could not discover whether other organs were affected. Apparently only the digestive functions were affected.

Observations: Retardation of fecal evacuations, heaviness in the epigastric region after eating, swelling of the abdomen with more or less tympanites, pain in the stomach. Vomiting sometimes in some patients, others said, "it seems as if some acid had risen up to the

mouth"; hyperchlorhydria reaction to all the disturbances of the psychic stage which preoccupied them when they could not satisfy the three chief desires of a youth of twenty years when a member of the army. These are: (1) To feed himself perfectly; (2) increase of weight by keeping well; (3) complying with the work and obligations demanded with the minimum of disturbance.

These patients were permanent visitors to the physician. Treated with purgatives or laxatives, they continued the same. Examination showed the white line of Sergent very evident in some cases, in others little so or negative. In so far as we used adrenalin we have considered its action upon the sympathetic nerve stimulating the smooth fibers of the digestive organs, their external secretions, its action upon the retention of calcium contributing to general recalcification, consequently to raising the tonus, approaching it to normal. We did not investigate whether there is or is not internal secretion due to the adrenalin. We accept the effects clinically observed and to which, as we say, we adhere in considering that the quantity of circulating adrenalin must be very slight since it is so difficult to encounter it in the blood some distance from the suprarenal capsule.

G. V., strong young man, constitution good. Some days before joining the forces became ill with acute gonorrhea. There seemed to be intestinal retention for 5 days. Abdomen swollen, tympanites, pain. Weight in the epigastric region after eating. Appetite diminished. Treatment with purgatives and laxatives gave no result. Adrenalin administered, solution 1:1000, 2 gtt. before breakfast and 2 gtt. before supper in a glass of water. We increased daily 1 gtt. up to 5 and 5. After the second day the patient seemed better through pushing it to 5 and 5 and this dosage was kept up for a month.

J. P., strong, had had grippe and bronchopneumonia. Some time after there seemed to be disorder of digestion. Vomited food some hours after taking it. No appetite. Intestinal retention as long as 4 or 5 days. Heaviness in epigastrium after eating. Abdomen swollen, tympanites. General weakness. Purgatives, laxatives of no avail. Adrenalin solution given beginning with 2 gtt. before breakfast and 2 before supper increased as with the former patient. Treatment continued 15 days. All the symptoms disappeared.

B. S., healthy, had had grippe. Some months after recovery apparent weakness, little appetite, food quickly causing indigestion. Heaviness in epigastrium. Intestinal retention 3 or 4 days. Patient grew thin. He is swathy, but his face filled up with darker spots with a visible purple desquamation in various parts. The white line of Sergent was positive. Purgation employed under observation. Afterward adrenalin treatment followed by recovery. The spots cleared and the desquamation disappeared.

J. B. B., sub-officer, healthy, constitution good. Some months previously following: Weight and swelling in the epigastric region, eructation of acids after eating. Abdominal tympanites, intestinal retention and even when he had a daily evacuation the movement was hard and dry. Preoccupation with his illness. Had had gripe and intestinal infection. Adrenalin treatment, complete recovery.

These patients were robust and presented merely digestive symptoms which were common to all, as if responding to the same cause and constituting a syndrome, as if the function of the sympathetic had become deficient through diminution of the function of the suprarenal capsule. We call attention to the rapidity with which the patients were cured by adrenalin. We note likewise that all this symptomatology appeared after an infectious disease, gripe, bronchopneumonia, acute gonorrhea, as if the toxins had acted upon the suprarenal gland determining hypofunction.

M. L., man forty-five years, vigorous, good constitution, well up to that time. His financial situation had been solid, well established from youth with good business, hard work with a regular capital. The world crisis, other factors, destroyed this capital. The mental effort to save something and his affective life were intensified. Depressive ideas also resting upon his exquisite sensitiveness greatly exaggerated his emotional condition. At that time his appetite seemed to fail. Weight in the epigastrium after eating. Sometimes vomited 3 or 4 hours after eating. Intestinal retention with abdominal tympanites. There was lipothymia with noises in the ears. These giddy spells increased in various ways daily until patient came for treatment. We administered 30 gtt. of adrenalin daily, 10 in the morning, 10 after breakfast, 10 after supper. In a few days diminished to 20, keeping this up for several months. Three years afterward the symptoms had not reappeared.

S. C., young man, intellectual, vigorous, professor in a secondary school, but for political causes he lost his chair. Always devoted to teaching, he had entered his position with enthusiasm. Studied and thought much. Strong sensibility and strong affections with family and friends. His disappointment intensified his mental activity and the reactions of his sentiments toward the calamity and the injustice exaggerated his emotivity. His struggle to improve the financial situation for himself and others became intense for some time. Then appeared the following: Sluggishness in digestion, retardation of the intestinal evacuations. Ready indigestion with condition of nausea appearing 2 or 3 hours after taking nourishment, especially after supper. This brought on sometimes a condition of cerebral congestion with semi-consciousness. Adrenalin in small doses cured all these symptoms.

As is seen these last two patients present the same symptoms of digestive alteration as the former patients without primarily having

had an infectious disease. Instead there was a psychic depressive state with exaggeration of the emotional state influencing the production of the symptoms.

Tofte, A. CALCIUM TREATMENT FOR NERVOUS HEADACHE. [Uges. f. Laeg., Feb. 8, 1923, LXXXV, No. 6.]

This is a clinical report of an instructive case of rebellious headache following an abortion. The blood was of the lymphatic type, and the woman was weak and languid. Under calcium, conditions returned to approximately normal, and later a normal pregnancy followed. The calcium was kept up throughout, and only once was there a transient tendency to headache.

II. SENSORI-MOTOR NEUROLOGY.

8. NEUROSYPHILIS.

Shaw, R. C. GASTRIC CRISES OF TABES DORSALIS AND THEIR SURGICAL TREATMENT. [British Journal of Surgery, January, 1922. Austr. M. J.]

The first half of the article is devoted to the discussion of the nervous paths involved in the production of the pain of gastric crises. The pain is of a composite character, being of two forms. The first is felt superficially in the body wall and is of two types. One is sudden and shooting and localized along the dorsal nerves, the other being dull and constricting and not well localized. The second form of pain in a crisis is felt in the epigastric region, generally to the left of the mid-line. It is severe and griping and accompanied by deep tenderness. After section of the posterior nerve roots, from the fourth to the eighth dorsal nerves inclusive, the pain which shoots along the course of the dorsal nerves is relieved, but the dull, constricting pain persists. In one patient who had posterior rhizotomy performed, the shooting and constricting pains were both relieved; but this patient had atrophy of his intercostal muscles. In two patients upon whom a similar operation was done and who did not have intercostal atrophy the dull, constricting pain persisted, as did also deep tenderness in the area supplied by the divided nerves, although cutaneous anesthesia was present. It is suggested from this that some of the afferent sensory fibers pass by way of the anterior roots. In two cases reported by Head the posterior cervical roots of the fifth, sixth and seventh segments were divided, but still deep sensibility remained in the area of cutaneous anesthesia. The second type of pain, localized in the left of the epigastrium, may be termed visceral. Severe and griping in character, it still persisted after the root section. It is probably due to stimulation of afferent nerves in the stomach wall. These are fibers contained in the vagus nerve and sympathetic nervous plexus. The irritation of the motor vagal fibers produces the vomiting of the crisis. This was not relieved

by the section of the posterior roots. Exner in one of his patients divided the vagus and completely relieved the deep griping pain, but in others, in spite of vagotomy, the pain persisted. Stimulation of the sympathetic in one of the cases of posterior rhizotomy was followed by a typical gastric crisis, so that he concludes that both the vagi and sympathetic nerves conduct the visceral sensory impulses, the sympathetic being probably the more important path. The vomiting of the crisis is produced by irritation of vagal or sympathetic afferent fibers which react on the motor nucleus of the vagus. In the operative treatment of the condition complete recovery seems dependent upon the interruption of afferent sympathetic impulses. This may be produced by dividing the antero-lateral ascending tract of the spinal cord between the second and third dorsal nerves, as done by Soutar, or by division of the posterior roots in the thoracic region. This latter reduces to a minimum the afferent impulses going to stimulate the vagal motor nucleus. Division of the vagus has important physiological sequelæ, the chief of which is gastric stasis. Probably the most satisfactory results follow posterior rhizotomy.

Raecke, Prof. SPIROCHETE FINDINGS IN THE BRAIN OF PARETICS. [Monatsschr. f. Psychiat. u. Neurol., Vol. XLIV, No. 2, p. 110.]

Citing Alzheimer, Spielmeyer, Hoche, and others, who, after Moore and Noguchi's discovery of spirochetes in the brain and medulla of paretics, defended the hypothesis of the toxic nature of the paralytic processes in the parenchyma as a separate process from the inflammatory, the author emphasizes his conviction that the phenomena of paresis are due to a direct injury of the nerve tissue by the spirochetes which are actually present in the brain. Whether or not these parasites which have penetrated to the brain produce a mechanical or chemical lesion is at present a minor question. Those who prefer to regard the process as due to a poison produced either by the living or dead causal agent and giving rise to destructions in the tissue in their immediate neighborhood do not come into conflict with the author's views that paresis is essentially a parenchymatous and interstitial encephalitis, caused by migrating spirochetes. It is quite consistent with this view that as a result of chemical action of the spirochetes when they have reached a place in the brain tissue, plasma cells should be collected in the vessel walls. But all this is nothing but a local effect of the virus and has nothing to do with a general toxic disease of the entire organism or with the conveyance to the central nervous system of a poison produced somewhere else in the body. Jahnke has suggested a whole series of possibilities in regard to the local influence of the spirochetes on the tissue, calling attention to the fact that hitherto strong virus has only been known to have been produced by the bacteria, never by protozoa. No one has ever proved that such virus is produced by spirochetes. All recent research goes to show that the old theory of a metaluetic poison is wholly unsupported and unsupported, and the view of the local inflammatory nature of the paretic

brain processes is irresistibly making headway, so that the old confused concept of an independent toxic degeneration and systemic disease will soon be nothing more than a subject of historical interest. The author states that Jahnke is led by his profound histological study of the subject to the opinion that paresis is undoubtedly a brain cortex spirochetosis, with varying localization of the spirochetes according to the extension of the disease. In conclusion, the author asserts categorically that the general paralytic changes in the tissue are not the result of coexisting degenerative and inflammatory phenomena but of a dissemination of spirochetes simultaneously in the ectoderm and mesoderm components of the brain tissue, and that the histological condition is the direct consequence of this dissemination. [J.]

Hauptmann. SPIROCHETES AND VESSELS OF THE CORTEX IN PARESIS. [Neurol. Centralbl., Vol. XXXVIII, No. 22, p. 725.]

In the majority of the paretic brains examined by Hauptmann no relation of the spirochetes to the vessels of the cortex was discernible. In some brains, however, were found, in circumscribed areas, vessels the walls of which as well as the lymph spaces were completely filled with spirochetes, while none could be found in the surrounding region, or if they were found there, were so few in number that they could not be regarded being connected with those in the vessels. In these cases it seems evident that the spirochetes have in some way found their way into the vessel walls and have there multiplied. Those histological pictures in which spirochetes are found in the tissue in the immediate vicinity of the vessels may be regarded as produced by migration of the spirochetes from the vessel walls. Here the accumulations in the surrounding tissue are not ranged in the form of outside walls or barriers about the vessel walls. The view that the spirochetes in these cases might have penetrated from the tissue into the vessels is rejected as improbable; for if it were assumed that the spirochetes from the tissue wandered into the vessels, it would be difficult to explain that distribution where the vessels alone are infested with spirochetes. That this mode of spreading (in the tissue) is sometimes taken by the spirochetes, however, is proved by those arrangements where the vessel walls only contain spirochetes as far as they pass through a tissue region infested by the parasites. In these instances the vessels may even act as an obstruction to the spread of the spirochetes so that they rise in a wall partly surrounding the vessel, avoiding absolutely the glia perivascularis. It is difficult to explain this distribution. The spirochetes cannot be regarded as dammed back, for they are usually not numerous in the surrounding tissue, nor can a suction on the part of the vessels be assumed. Formation of these barriers by a migration of the spirochetes from the vessels also seems improbable. Besides there were combinations of these different types of distribution where some vessels infested with spirochetes had barriers of parasites

about them, or where vessels infested with parasites in a part of their circumference were partly surrounded by barriers. A very interesting question is why vessels which were thickly infested with spirochetes (so that this fact could be clearly recognized in the silver preparation) showed no local reaction in the sense of specific syphilitic changes. [J.]

Gordon, Alfred. CONJUGAL SYPHILIS OF THE NERVOUS SYSTEM. [Am. Jl. Syph., April, 1921.]

It was in the year 1887 that the first authentic observation concerning conjugal paresis was placed on record. Acker and Ziehen report cases of two couples from parietic cachexia. Since then a large number of cases have been published by French, German, and American writers, showing that when one member of a married couple is suffering from paresis or tabes the other may also become affected with one of these two maladies, but not necessarily with the same form of the syphilitic disease. It was further observed that not only the wife will eventually develop the disease from which the husband has been suffering for years, or vice versa, but also the children living with diseased parents may become either tabetic or parietic. Such observations we find in the work of Bernstein and Artemoff. During a period of eight years I have been collecting cases of syphilitic affections of the nervous system which developed during conjugal cohabitation and I have succeeded in obtaining full records of thirty-two such individuals. Their histories are given in the present contribution.

The following chief features were investigated: The onset of the affection in each parent and the date of its appearance in the second parent after the malady had existed in the first parent a certain number of years: the onset of the syphilitic infection in the original parent; finally the Wassermann reaction. It can be seen that not only tabes and paresis in their classical forms were present, conditions which were found by the majority of observers, but also other forms of nervous manifestations referable to the brain and spinal cord or to both. Thus in my series five such cases were observed. Comparing the date of appearance of the first symptoms of tabes or paresis in the second parent with that of cerebrospinal symptoms of nontabetic or nonparetic character in the same parent, we find that in the largest majority of cases the date of appearance of the former is much later than that of the latter. The number of years of the former ranges between seventeen and five years after marriage. As far as possible an effort was made to ascertain the medical histories of the wives prior to their marriage, or of the husbands whose wives became diseased first. It is interesting to note that in the majority of cases of tabes or paresis symptoms appeared many years after the beginning of conjugal life. However, in cases in which second marriages occurred or marriage relations after separation from the first wife were maintained, the appearance of syphilitic manifestations was

earlier in the second wives than in the first ones. It is difficult to find a satisfactory explanation for this peculiar and apparently paradoxical phenomenon.

The next interesting observation concerns the transmission of nervous syphilis to men heretofore healthy through the intermediary of women who developed syphilis of the nervous system many years after their marriage to men having a positive Wassermann reaction. In one case, for example (4a), the husband had taboparesis at thirty-eight. His first wife lived with him five years. She later married a divorced man, presumably healthy, whose first wife brought him two healthy children. Eight years later both showed symptoms of tabes. In another case, a married woman, who, after having had three healthy children with her husband heretofore healthy, became the mistress of a married man whose Wassermann reaction was positive and who when examined at fifty-one showed signs of paresis. After five years of this double life she developed symptoms of tabes and her legitimate husband signs of cerebrospinal syphilis, with a positive Wassermann of the spinal fluid. In still another example (Cases 7a and 7b), two men, one single and the other married, heretofore healthy, had prolonged relations with one woman who began to show symptoms of tabes one year after the death of her husband, who had a chancre one year before marriage. The single man, five years after continuous relations, commenced to show symptoms of cerebral syphilis (Wassermann positive of serum). The married man eight years later presented evidences of tabes, with a positive Wassermann of the spinal fluid.

Nervous syphilis may be transmitted not only to individuals who lead an intimate conjugal life, but also to persons who live constantly together in the same dwelling, such as close relatives who may come in daily contact with each other for years. In the case of 9a, for example, we see that she is twenty-two years old, always lived with her oldest brother, J. P. (Case 9), who at forty showed symptoms of paresis and whose two mistresses had respectively symptoms of cerebral syphilis and tabes. This sister, whose parents were healthy and left five healthy children, herself a music teacher and of excellent habits, commenced to show symptoms of cerebral syphilis at twenty-two, with a positive Wassermann of the spinal fluid.

The present study indicates also another important feature from a diagnostic standpoint. It shows that there were more positive reactions of the spinal fluid in the second party, who developed nervous syphilis after the beginning of conjugal life, than in the first party of the married couple. Conversely, there were fewer positive reactions of the blood and spinal fluid combined in the first than in the second group (2 to 5). Moreover, in the two cases mentioned above (9a and 10b), in which there were no sexual relations, but merely cohabitation (sister and son, respectively), the Wassermann reaction was positive only in the spinal

fluid. The foregoing observation points rather to the advice that in all such cases it is pertinent to commence with a biological test of the spinal fluid: if the latter is found positive (which is most frequently encountered) a blood test could be entirely avoided. It is only when the former is negative that the latter must be resorted to.

The conclusion which can be drawn from the present study is that conjugal syphilis is more common than it is generally believed, that it may be present not only in the wife after she has cohabited with the man for a number of years, but also in every other individual (sisters or brothers) living in the same dwelling with the affected person after a number of years.

A few problems remain to be solved: By what mechanism is the infection transmitted to the wife and why do the symptoms make their appearance in the latter so many years after she had cohabited with the man? The query is particularly difficult for solution when it concerns relatives other than wife or husband, namely, persons that did not come into intimate relations with the original carrier of the disease.

Another problem which requires discussion is why in some cases the wife develops tabes, in others paresis, and in still others cerebral syphilis; also why in some cases she has the same form of nervous syphilis as her husband and in others a different form. Is it because, in accordance with Edinger's exhaustive view, one fatigues more his spinal axis and will develop tabes and the other overfatigues more his cerebral portion of the nervous system and will develop paresis? Finally, are these special localizations controlled or influenced by hereditary conditions which present a locus minoris resistentiae to the invasion of the syphilitic virus? These are all problems which in the light of our present knowledge cannot be solved categorically, but are all important subjects for consideration and reflection. It must be borne in mind that not only tabes and paresis, as it was formerly believed, but also all forms of nervous syphilis may be encountered in the other partner of the conjugal couple. Special emphasis deserves the occurrence of such conditions in sons and daughters who live with their affected parents irrespective of hereditary transmission of syphilis. [Author's abstract.]

Jakob, A. INFLAMMATORY FOCI AND MILIARY GUMMATA IN THE CEREBRUM IN PARESIS. [Ztschr. f. d. ges. Neurol. u. Psychiat., Vol. LII, p. 7.]

The author gives special attention in this article to the finer anatomical brain degenerations accompanying sudden intensifications of the disease processes, and especially to those connected with paralytic attacks. Examinations of fifty cases were made and changes in the parenchyma (ganglion cells and Marchi's bundle) showed no deviation from the usual picture in inflammatory diseases; only in five cases there were small foci of granular cells with content of blood pigment in the cells, and in two cases there were ameboid cells. The changes accompanying

the acute inflammatory processes were principally the pathological processes in the connective tissue apparatus of the vessels, manifested in increased infiltration of the pia, of the cortex and medullary vessels; in migration of the infiltration elements of the cells into the nerve tissue; in the construction of lymphocyte foci; in the onset of encephalitic processes; and further, often, in the development of gummatous changes in the vessel walls and of miliary gummata in the cortex of the cerebrum. There were also endarteritic proliferations in the vessels of the cortex. These histopathological conditions at the foundation of paralysis with paralytic attacks, especially the components of the inflammatory processes, emphasize the close connection of this disease with the specific syphilitic processes on the one hand, and its similarity on the other, with certain infectious diseases of other genesis, as, for example, poliomyelitis anterior and the acute foci of multiple sclerosis. In the author's opinion the histological findings fully prove that paralysis of this form is an infectious disease and that the paralytic attacks stand in direct causal relation with an acute increase of the living exciting cause of the fundamental disease, *i.e.*, to the spirochetes and their virus. The author refers to the two views entertained concerning the brain processes in syphilis, namely, that of Nissl and Alzheimer, defended also by Spielmeyer, that the inflammatory processes in the vessels and the degenerative parenchymatous processes are separate from each other; and the view emphasized by Stargardt and Raecke, according to which both phenomena are derived from the same inflammation. In the author's opinion those foci which represent a parenchymatous degeneration of noninflammatory nature are in support of the former view. The further discussions of the author touch on the biological side of the metaluetic problem. He applies the discoveries of Lewandowski concerning the reaction of the body to bacteria obtained by inoculating guinea pigs with tuberculous virus, and arrives at the view that the phenomena of paresis are due to the fact that the general reactions of the body are inadequate to destroy the spirochetes. The gummata frequently found in paresis are constructions resulting from ineffective efforts of the tissue to change the process into a benign one. There are not sufficient antibodies in the brain, the efforts are futile, and in consequence the diffuse ordinary inflammation dominates the histological picture. When the inflammatory phenomena, together with the clinical and biological facts, are taken into consideration paralysis must, in the author's opinion, be regarded as a malign syphilis of the brain. [J.]

Schneider, Erich. DEGENERATION FORMS OF THE *TREPONEMA PALLIDA*. [Ztschr. f. d. ges. Neurol. u. Psychiat., Vol. XLVIII, p. 294.]

The author discusses the various forms of spirochetes observed in a case where nearly all of the parasites were of abnormal type. Following Jahnelt, the author ascribes this phenomenon to the fact that the case was just at the phase of the disease process when the spirochetes were in a regressive period, and that therefore the forms met with were in various

stages of degeneration. The transitions to disintegration seem to follow two main trends of modification, and these modifications may be combined in various ways. In one type the parasite apparently rolls into a knot or ball, while in the other there seems to be a direct destruction of the substance of the body of the microörganism, at first with preservation of the periplast, followed by breaking up and disintegration into minute pieces. From this single example it cannot be determined whether or not the rolled forms may be referred to the same process as the disintegration, but it is possible that the difference in the resulting form is due to the fact that the defense substance of the body works more slowly in one place than in another, so that the spirochetes seek to survive by rolling into knots, while a more direct destructive force produces their immediate disintegration. [J.]

Sioli, F. SPIROCHETA PALLIDA IN GENERAL PARESIS. [Archiv f. Psychiat., Vol. LX, p. 410.]

The author examined thirty-two brains of paretics and describes 16 cases in which spirochetes were found. This percentage, 50 per cent, of positive findings is high in view of the fact that the cases were not specially selected clinically, and the author is of the opinion that it would be even higher with better adapted methods of examination than are at present available. Jahnke's method was used, which, because the fibrils are not impregnated, permits the spirillae to be quite clearly recognized. Both typical and atypical forms were present, and in general they resembled those found in other syphilitic types. The spirochetes were accumulated in greatest quantity in the first frontal convolution, and next in this regard came the central convolutions, but spirillae were also discovered in other parts of the brain, sometimes in the occipital convolutions, while the frontal parts were free from them. In one case they were found in the cerebellum. This distribution corresponded in general to the nature, degree, and localization of the changes in the tissue. In three cases isolated spirochetes were found in the first cortex layer, but for the most part they were in the deeper cortex. In the case in which they were found in the cerebellum, they were situated in the molecular layer. They were often arranged in swarms, and sometimes isolated spirochetes were lodged in the neighborhood of these swarms. The majority of cases, however, showed diffuse distribution. The numbers discovered in different brains varied greatly. In the same brain one hemisphere was sometimes completely filled with spirochetes, while none could be found in the other. There seemed to be little connection between the special tissue elements and the spirochetes, though some slight predilection for certain elements seemed indicated. For example, there seemed to be an accumulation of the parasites around the ganglion cells, though there was no evidence of a penetration of these cells. Connection was somewhat more rare with glia cells, but still more frequent than with infiltration cells and vessel sheaths. Occasionally a spirochete was found

perpendicular to the cortex, indicating that it might be following a nerve fiber. Among the author's cases with negative spirochete findings were two where death occurred as result of paralytic attacks and six cases with paralytic dementia, being evidence that spirochetes are more likely to be found in cases where death occurs in attacks or afterward than in slowly developing cases that end in stupid dementia. In regard to the nature of paralysis, the author states that while it has been shown to be a disease of the brain due to spirochetes, its origin and development are still obscure, but that it is not necessary, in view of any evidence so far adduced, to assume an acquired neurotrophic quality or biological transformation of spirochetes to explain either the paralytic or other metaluetic disease processes; the peculiarities of metalues can be understood as due to differences in the organ attacked, the "difference of terrain." [J.]

Sioli, F. SPIROCHETE FINDINGS IN LISSAUER'S PARALYSIS. [Neurol. Centralbl., Vol. XXXVIII, No. 22, p. 727.]

In a case of this character the histological findings were: (1) In the larger part of the brain cortex the usual paralytic disease processes in a medium degree, together with spirochetes in diffuse distribution and in varying quantities; (2) in circumscribed lesions in the convolution regions, alterations of more pronounced nature, the histological character of which showed that they represented an intensification of the disease process, and in these regions the spirochetes were extremely numerous and distributed diffusely; (3) an extreme degree of atrophy limited to one convolution, which had the character of being the end product of the disease process when it was no longer active. In this region there were few spirochetes. It is to be assumed in this case that the atrophic lesions were the final stage of the acute aggravations in the form of foci of the general paralytic pathological changes, and that these local aggravations were caused by regional increase of spirochetes, and that in the atrophic tissue areas the spirochetes had for the most part become extinct. [J.]

Nissl, F. HISTOPATHOLOGY AND SPIROCHETE FINDINGS. [Ztschr. f. d. ges. Neurol. u. Psychiat., Vol. XLIV, p. 436.]

The author discusses conclusions which Raecke draws from Jahnel's researches concerning spirochetes in paretic brains. The author's view is that the alterations of tissue due to paresis are brought about by two parallel disease processes, one of inflammatory and the other of non-inflammatory nature (the so-called degenerative process)—a view to which Alzheimer and Spielmeyer have contributed convincing evidence. Raecke, on the other hand, holding this theory to be erroneous, asserts: "It is now proved that a single inflammatory process is at the foundation of all the pathological changes in general paralysis." The author holds that Raecke bases his assertion solely on the proof that spirochetes are found in the brains of paretics, and that this fallacy is at the root of all Raecke's reasonings; for while it is true that the arrangement of spiro-

chetes in the brain may furnish valuable explanations for certain changes in the brain tissue, the principle of the simultaneous existence of two histopathologically different processes has nothing to do with the spirochete distribution. The existence of inflammatory and degenerative changes side by side in this disease process is a fact anatomically established. Raecke's efforts to explain the regressive and progressive changes in the tissue at points where there are no exudative phenomena or very slight exudation as secondary results of an inflammatory process or as the residuum of no longer active processes of this sort, are unsuccessful. His assertion that the spirochetes penetrate directly into the body of the nerve cell, thus destroying them, is unsupported by evidence, as well as his assumption that the deviation in character of cell changes in paralysis from that of other known pictures of acute and chronic cell changes, especially those arising from toxic conditions, is thus fully explained. Besides, Raecke has misunderstood the position of Alzheimer and Spielmeyer in regard to this question and misinterprets Jahnel's findings. Alzheimer's opinion is that paresis is certainly a syphilitic disease, but that it is essentially different from that which is designated a specific syphilitic process; in applying the term "metalties" to it he does not use the word to signify a sequella of lues. Spielmeyer's principle (1912) that the noninflammatory changes may be caused by the spirochetes just as well as the so-called specific cell infiltration more clearly stated means that there is no reason why spirochetes should not give rise to non-inflammatory degeneration in addition to those changes which are of inflammatory nature. [J.]

Jahnel. SPIROCHETES IN PARESIS. [Neurol. Centralbl., Vol. XXXVIII, No. 22, p. 726.]

Jahnel found in the brain of a paretic on whom the autopsy was performed immediately after death that the spirochetes were motile in varying degrees, according to the section of the brain from which the material was taken, and he infers that the spirochetes were in different phases of biological development in different areas of the brain. He succeeded in inoculating the testicles of a rabbit with an emulsion from this brain, and the results became apparent after an incubation period of about seven months. This case showed the vascular arrangement of the spirochetes and, besides, the small foci with the light brown colored spirochetes in the center to which Hauptmann has called attention. The author interprets the vascular arrangement of the spirochetes as one stage of the arrangement in circumscribed colonies or swarms, and refers to the transitional forms between the pure vascular distribution and the massive focal forms of distribution. He calls attention to the peculiar types of the vascular foci (globular, egg form, mushroom form, bead form), which reveal their relationship with the lesions in form of bundles and masses. The arrangement of the spirochetes in such a way that they ascend one wall of a vessel higher than another, and that in a cross

section of a vessel they are found to only partly surround it, is the result of the peculiarity that the spirochetes on the vessel walls suddenly cease wherever the spherical surface of the foci intersects the vessel. The reason of the regular form of the foci as well as of the brown color of the spirochetes in the center of certain foci is unexplained (this latter phenomena is also observed in the vascular distribution). Jahnel has devised a new method which permits the coloring of the spirochetes in separate cuts, and hence a much better presentation of the tissue changes and the spirochete picture. By this means it will be possible to determine whether the colorings in the Nissl picture described by Hauptmann correspond to spirochete foci. [J.]

Jahnel, F. RELATIONS OF SPIROCHETES TO THE COURSE OF PARESIS.

[Zeitsch. f. d. ges. Neur. u. Psych., Vol. XLII, p. 21.]

Although in a considerable percentage of cases of paresis it is not possible to find spirochetes in the brain, the author thinks they may be assumed to be present. He points out that if there were unlimited and constant increase of spirochetes in the paretic brain, it would be possible to find them without any difficulty in every case and in every section. But paresis then would not be a chronic disease, but a disease which in a few days would end in death, and would resemble another infectious disease of the nervous system, hydrophobia, the causal agent of which can always be found in the nervous system. Sometimes a similar behavior of the disease process is observed in paresis. During a chronic course there are occasionally epileptiform or paralytic attacks which are designated strokes. Every sudden death from paralysis is a form of such a stroke, and in patients where the disease thus terminates fatally numerous spirochetes are nearly always found concurrently in various parts of the brain. As to the manner in which the disease produces the changes in the brain, the author thinks there can be no assumption of influence from a distance in the sense that the spirochetes affect the central nervous system through a poison coming from some other organ. Just in what way the brain is injured by the spirochetes so that the paralysis results is by no means clear. The paralytic alteration of tissue as presented in the microscopic preparations are the final results of a gradual progressive disease, the sum of all the pathological processes which have been active for a long period, while the picture presented by the spirochetes represents only an instantaneous condition at the moment of the exitus of the patient, a picture which changes rapidly with the death of the spirochetes. The larger or smaller number of spirochetes which happen to be in the affected places cannot be made responsible for all the pathological changes, for the diseased ganglia as well as for the plasma cells and the other paralytic changes in the tissues. Nor, on the contrary, when the spirochetes are not found in special sections or indeed in any of the preparations, can their influence in producing the changes, for this reason, be denied. The changes which seem more or less inde-

pendent of the spirochetes may be traced to them in the sense that they are due to processes set up by them in sites from which they afterwards disappeared. Paresis is distinctively a disease of the brain cortex, or, to be more precise, a spirochetosis of the brain cortex. The different parts of the body affected by the paretic process corresponds to the localization of the region injured by the spirochetes. The disappearance of the nervous parenchyma is independent of the inflammatory changes of the vessels. The author is of the opinion that the spirochetes are propagated more plentifully in the gray substance because it is best suited for their nutrition, and suggests "polioencephalotropism" to describe the phenomenon. He claims for his article that it approaches the problem of paralysis from a new point of view, *i.e.*, from that of a study of the characteristics of the causal agent, the *Treponema pallida*. [J.]

Jahnel, F. SPIROCHETES IN THE BASAL GANGLIA IN PARESIS. [Monatschr. f. Psychiat. u. Neurol., Vol. XLII, No. 1, p. 58.]

Although the author has examined the basal ganglia of only a few cases of paresis for spirochetes, he has found them in three cases. It may therefore be inferred that they are present in numerous cases. The assertion of Alzheimer that the basal ganglia are regularly diseased in paresis is explained, in the author's opinion, by the fact that the sub-cortical ganglia are electively attacked by the spirochetes. That the spirochetes are not found in this region in all cases is due to special causes, and this fact cannot be used as an argument against the significance of the spirochetes in the production of the paretic disease process. [J.]

Jahnel, F. NEW RESULTS OF EXAMINATIONS FOR SPIROCHETES IN PARESIS. [Allg. Ztschr. f. Psychiat., Vol. LXXV, p. 503.]

The author refers to a biological peculiarity of spirochetes which he has observed in numerous cases, *i.e.*, that they increase periodically and that there are intervals in which comparatively few can be found—a fact partly explaining their absence at the time of autopsy in some paretic brains. The real point of interest, however, is not to prove that spirochetes are present in every paretic brain, but to ascertain as many details as possible in regard to their localization in the diseased tissue and the conditions under which this causal agent enters the central nervous system. In regard to the distribution of the spirochetes, the author in other communications has distinguished two types, namely, the distribution in massed foci and the disseminated distribution. He is now in a position to add another type of distribution, the vascular, in which the vessels of the brain are principally attacked. Not all the vessels are penetrated by the spirochetes, but usually those in a circumscribed area, and here for the most part the capillaries, but larger vessels and veins are also sometimes surrounded by a mantle of parasites or the walls are invaded by them. Though the parenchyma in these regions is not entirely free from

spirochetes, they are much less numerous in the nerve tissue. There is often a fusion of perivascular spirochetes into larger lesions, and the author suggests that the large massed spirochete lesions may originate in this way. Where distinct vascular distribution is found in one part of the brain, it is not limited to a single region, but the same form of distribution is preserved throughout the entire brain. In other forms of distribution there are usually few spirochetes in the upper layer of the brain surface, but in the vascular distribution their occurrence in this layer seems to be a typical and regular feature. The author describes two characteristic cases of the vascular distribution; in neither were there any clinical symptoms indicative of the type of spirochete arrangement. In explanation of this form of distribution the author emphasizes that the spirochete is a lymph parasite and would naturally be most plentiful in the vessel walls, adventitial lymph spaces and the perivascular regions. He thinks it possible that the different forms of distribution represent different phases of the evolution of the causal agent of the disease and that the mixed forms are not combinations but transition from one phase to another. From various observations he is convinced that the spirochetes are carried to the brain through the blood circulation, though it is not impossible that they may arrive there over the lymph paths, and that the transportation by the circulation plays only a minor rôle or no rôle at all. The spirochetes of light brown color in the center of the foci first noticed by Hauptmann were also found by the author. In the zones free from parasites peculiar isolated globes or knots were found which may be regarded as the final form taken by the spirochetes as they die out in particular tissue areas. [J.]

Joseph, H. A RARE CASE OF SYPHILIS OF THE CENTRAL NERVOUS SYSTEM ASSOCIATED WITH DISEASE OF THE HYPOPHYSIS. [Zschr. f. d. ges. Neurol., Vol. LVIII, 56.]

A woman fifty-three years of age; stillbirth. Clinically optic atrophy, pupillary disturbances, convulsive attacks and attacks of loss of consciousness, speech disturbance, spastic and flaccid paralysis, mental deterioration with restlessness, disorientation and confabulation; Wassermann negative in the blood, incompletely positive in the fluid; slowly progressing deterioration without fluctuation. The clinical diagnosis was first tabes, then paresis; finally, on the ground of longer observation of the pseudo-bulbar paralytic picture, syphilitic brain disease(?). The anatomic findings, which constitute the chief interest of the case, show, beside a number of larger gummata in the right temporal lobe, diffusely scattered small granulomata in the cerebellum, pons, oblongata and spinal cord and above all miliary gummata or accumulation of epitheloid cells and also small foci of lymphocytes and perivascular infiltrates. General luetic meningitis with tendency to formation of nodules. Very small gummata upon the inner side of the dura spinalis. No diffuse disease of the brain, especially nothing that might be interpreted as paresis. Spirochetes could

not be demonstrated. Disseminated miliary gummata of the central nervous system have so far been described only as (rare) phenomena accompanying paresis (Sträussler, Jakob, and others). Besides there were present in the enlarged hypophysis extensive peculiar alterations which clinically had created no symptoms and apparently represented a peculiar histologic form of syphilis. Details must be omitted here. Simmonds has found the same process in four cases, though it is true he has not explained them as syphilitic.

Ghelfi. RAYNAUD'S DISEASE AND SYPHILIS. [Riforma Med., February 12, 1921.]

Ghelfi reports three cases in which, although there was nothing to suggest syphilis at first, the failure of all ordinary measures in treatment of severe Raynaud's disease led to the assumption of a syphilitic origin. This was confirmed by the prompt and complete recovery under specific treatment. In one of the cases several phalanges of the feet had dropped off. [J. A. M. A.]

Merklen, P. ENDOCRINE GLANDS AND MILD NEUROSYPHILIS. [Médecine, July, 1921, II, No. 10.]

In this clinical paper the intermediation of the ductless glands is accounted responsible for the asthenia which is one of the types of so-called neurasthenic syphilis. He advises investigating the endocrine system and examining for traces of syphilis, and combining organotherapy with specific treatment, especially in inherited syphilis.

Marthens, J. G. NEUROSYPHILIS.

Upon the request of Dr. Baber of the Dayton State Hospital, I have been enabled to study and treat the patients whose admission to the hospital was due to syphilis. The results of a full year's work have been published in detail, including our methods of treatment, intravenously and intraspinaly, also numerous case reports with the clinical and laboratory findings in each series of treatment. This abstract of that work is intended to present an outline of method, findings, and conclusions with the hope that the facts presented may be of value to the profession.

One hundred and sixteen cases were treated, classified as follows:

Condition	Number
General paralysis.	59
Tabes dorsalis and pre-paresis.....	9
Cerebral spinal syphilis.....	30
Gumma of brain.....	1
Dementia precox with syphilis.....	4
Syphilis with tuberculosis.....	3
Syphilis with morphia.....	2
Manic-depressive with syphilis.....	1
Other cases with positive Wassermanns.....	7

Sixteen patients died during the year, the cause of death being as follows:

Cause of Death	Number
General paralysis.	8
Gumma of brain.	1
Results of appendectomy.	1
Tabes and general paralysis.	2
Tuberculosis.	3
Chronic nephritis with mitral insufficiency.	1

The following routine treatment was carried out in all cases, with occasional interruption for rest periods when laboratory findings indicated that tolerance had been exceeded: As a rule, a course of mercury and potassium iodide preceded the intravenous treatments, which were followed by the intraspinal medication. For one month mercurial inunctions were given, $7\frac{1}{2}$ grs. daily of 33 $\frac{1}{3}$ per cent ointment. During this time potassium iodide was administered 15 grs. t.i.d., increasing 1 gr. each dose daily.

Following the thirty days of mercury inunctions and potassium iodide, intravenous treatments began with the usual methods of preparation, administration and care in giving arsphenamine. Six intravenous injections of arsphenamine at weekly intervals, beginning with .3 gm. and increasing to .5 gm. The gravity form is used in all cases unless the veins are too small or cannot be discerned. In case of small veins neo-arsphenamine with fine needle and syringe method is substituted, and when no veins can be found the rectal method of administering arsphenamine is used.

Dosage—Beginning with .5 gm., increasing .5 gm. weekly till 2 gm. per dose is reached. During the year 1,064 intravenous treatments were given with no severe reactions and no deaths. Rectal treatments numbered 98.

The treatment, as described, continues for six weeks; the seventh week a spinal puncture is made and fluid withdrawn for laboratory examinations and a treatment given. Even though the tests are negative, no harm has resulted from administering fortified salvarsanized serum. If the spinal tests prove negative, treatment is discontinued for thirty days. A blood Wassermann is then made, and if positive treatment is resumed; if negative, the patient is given a three months' rest. At the expiration of this time a second blood Wassermann is made, and whether positive or negative, treatment is continued.

If the spinal fluid findings are positive a treatment of arsphenamine, either intravenously or by rectum, is given every two weeks, and the following day an intraspinal. If the laboratory findings become negative, the treatments are discontinued; otherwise a series of ten are given before the patient is given a rest.

If the slightest trace of albumin or sugar is present in the urine,

treatment is discontinued until this condition clears up. After six intravenous, begin the intraspinal treatments. Half an hour after the seventh weekly intravenous injection is made in the patient who is to receive a spinal treatment, blood is withdrawn and the fortified serum prepared after Swift-Ellis method. This serum is salvarsanized by adding a solution of saline and salvarsan, 1 c.c. of which contains .1 mg. of the drug. The desired dose is added to the serum. The minimum .1 mg. is increased with each succeeding treatment to $\frac{1}{4}$, $\frac{1}{3}$, .4, till the maximum .5 mg. is reached. All intraspinal therapy is carried out under the accepted standards of asepsis with the usual preparation and after-care of the patient. Five hundred and thirty spinal treatments were given without serious reactions and no deaths; 460 were of fortified salvarsanized serum; 70 were of mercurialized serum. The mercurialized serum was used in several cases where there was no improvement clinically or serologically after the use of salvarsanized serum; in two of these cases very decided improvement was made.

At present there is not a case of general paralysis confined to bed in the Dayton State Hospital. Eight (five men and three women), whose clinical symptoms are much improved, are at home. Twelve have been home for thirty-day periods and have returned in good condition. Those remaining in the hospital are able to do various kinds of work.

Of the fifty-nine cases of general paralysis treated throughout the year, fifty-one are living, none confined to bed, eight are home, twelve have had trial visits, and nine more will probably have permission to go home for a limited time. All these patients have not had the series completed at the writing of this paper.

Seven of the older patients developed catarrhal jaundice during the year; fortunately all recovered. There seems to be no signal to indicate when jaundice may occur.

These patients are now receiving spinal treatments only once a month. If at any time there is a loss of weight it is better to discontinue treatments for at least a month. This is probably due to the patients becoming fast to the drugs used.

Conclusions.—(1) All cases of neurosyphilis should receive the benefits of intensive intraspinal therapy. (2) The incidence of improvements after treatment is greater than the ordinary remissions characteristic of paresis. (3) Paretics show a greater degree of improvement after the administration of mercurialized serum than of fortified salvarsanized serum. Mercurialized serum seems to be contra-indicated in tabo-paretics. [Author's abstract.]

Wile, U. J., and Hasley, C. K. NERVOUS INVOLVEMENT IN PRIMARY SYPHILIS. [Journal Amer. Med. Assoc., January 1, 1921.]

The authors report the results of investigations of the cerebrospinal fluid in 221 cases of primary syphilis. In 22 per cent of the cases definite deviations from normal were recognizable in the cerebrospinal fluid.

Wechselmann in 1912 drew attention to the involvement of the nervous system in the pre-roseolar period of syphilitic infection, and came to the conclusion that in the primary stage of syphilis the lymph spaces of the nervous system may become the site of syphilitic infection and may cause deviation from normal in the cerebrospinal fluid. The results obtained by this observer have since received adequate confirmation. In the series of 221 cases now reported by Wile and Hasley, in which a primary sore only was present, 106 failed to give a Wassermann reaction with blood serum. Lumbar puncture and systematic examination of the cerebrospinal fluid was carried out in every case of the series. Deviations from the normal criteria were found in 60 instances. Of this number, in 11 there was merely an increase in cellular count; in the remaining 49 definite involvement of the nervous system could be properly assumed as evidenced by pleocytosis, increased solids and the Wassermann reaction. The colloidal gold test was unfortunately not carried out as a routine procedure. Clinical evidence of gross involvement of the nervous system recognizable by physical examination was only recorded in a single instance in the whole series of cases. It is concluded that pre-roseolar involvement of the nervous system occurred with recognizable deviations from normal in the cerebrospinal fluid in 49 out of the 221 cases examined. The involvement for the most part was regarded as of the nature of a transitory roseola of the meninges without necessarily resulting in permanent damage to the nervous system, since it was found that the cerebrospinal fluid was rapidly restored to normal in the majority of cases by intensive anti-specific treatment. Positive findings in the cerebrospinal fluid in a case in which the Wassermann reaction in the blood serum has not yet been obtained must be regarded as indicative of generalization of the infection, the laboratory criteria of infection, as applied to the cerebrospinal fluid, being of greater delicacy than examinations of the blood serum. These results parallel the previously reported findings with regard to generalization and dissemination of infection in rabbits.

III. SYMBOLIC NEUROLOGY.

1. NEUROSES.

Del Valle. THE SUBCONSCIOUS. [Spanish Letter, J. A. M. A. 1923.]

On his admission to the National Academy of Medicine, Dr. R. del Valle y Aldabalde, physician in the Madrid General Hospital and author of many works on nervous diseases, read a paper on the subconscious. Del Valle considered that Avicenna and Schopenhauer were forerunners of Freud in psychoanalysis. Avicenna ("Canon," chapter De Ilix), in describing symptoms, especially the irregular pulse caused by love—which he classifies among mental diseases—says: "In this way it is possible, even though the patient may deny his feelings, to identify the

person loved, and to base on this knowledge a mode of treatment. The method consists in repeating certain names while the patient's pulse is being read. As soon as the pulse shows any irregularity, the trial is stopped and one begins again. I have tried this method more than once, and discovered through its use the name of the person loved by the patient." Here is psychanalysis in the eleventh century, even with its sex interpretation. [Here is the "unconscious," not psychoanalysis. This type of observation is reported as early as Moses, or Haner. Ed.]. Del Valle also recalled Schopenhauer's words: "If a quarrel, unpleasant news or remembrance is so painful as to become unbearable, then nature itself causes insanity, as a last source of salvation."

Dr. Palacio Valdés, another physician in the general hospital, welcomed the new member and spoke entertainingly on the same subject. Fifty years ago, people considered as subconscious facts, ideas or images which, through continual conscious repetition, have lost their cerebral character and have become automatic, requiring neither intelligence nor attention. Palacio Valdés knows a woman, aged eighty-four, who often does not recognize her own children and is much deteriorated; yet she can play well on the piano. Ribot has stated that personality is made up by two factors, psychic and somatic, the former originating in the latter, which is the bodily sense of cenesthesia. Pathologic conditions may split these two elements apart and create a dual personality. Palacio Valdés described a woman, aged twenty-eight, who was admitted to the psychiatric department of the general hospital a few years ago, suffering from alternating or manic-depressive insanity. This was her third admission to the hospital and she was in a state of depression. This was so pronounced as to pervert her personality and cause a rare and curious syndrome, which is of great interest because of the light it throws on this much debated psychologic problem. The patient spent all night and part of the day lying in bed or on the floor crying. "Are you hurt?" attendants asked her. "No." "Then, why do you cry?" "Because I'm dead and they are going to bury me alive." She persisted with these thoughts for about fifteen days. Some time after her discharge, Palacio Valdés met her on the street. She greeted him and told about her agony in the hospital. "But what made you think you were dead?" he asked her. "Nothing, nothing at all. I felt nothing; and that's what made me think I was dead." "But you knew you were alive." "I did. It is all very strange and inexplicable. I must have been crazy." Palacio Valdés considers this a disintegration of the ego. The patient had lost the vital or bodily sense, her cenesthesia. It was not amnesia, for she must have been able to recall her former life, or she couldn't have suspected that she was dead. On the other hand, she was afraid of being buried alive. Even in the midst of her derangement she reasoned logically. Her primitive ego, the bodily sense, had disappeared, but her secondary or psychic ego survived. Turning

to metaphysics and telepathy, Palacio Valdés told of an old woman who came out on the street one night screaming pathetically and begged help for her son, who was being murdered. The neighbors attributed her excitement to the nervousness of old age. The next day, the boy was found murdered at a spot three miles from town. In concluding, Palacio Valdés asserted that the study of unconscious phenomena is now where alchemy and astrology were four centuries ago. Man's intelligence and effort cleared up the mysteries of those early speculations, which have since become chemistry and astronomy. This is a guaranty that the unconscious will be unraveled.

Schilder, P. THE UNCONSCIOUS. [Zschr. f. d. ges. Neur. u. Psych., LXXX, Nos. 1-4.]

Schilder's consideration of the question from all points of view leads him to conclude that there is no unconscious psychic life. He believes that the characteristics which Freud ascribes to the unconscious are found mostly in the background of experience, the "sphere" or the "fringes." Certain relationships between the phenomena found here and those appearing with diseases of the brain lead him to the theory that organic events are identical with the mechanism of the impulses, that the body is a psychic process which has attained form.

House, William. THE PATIENT'S MIND. [J. A. M. A., July 21, 1923.]

The sick body is always accompanied by a sick mind. Many sick persons have no organic disorder, but suffer from the effects of suggestion either within or from without. If suggestion produces disease, it can also cure disease. Recovery of both mind and body is retarded by fear, worry and misinterpretation of symptoms, and is hastened by their removal. Much of the success of the cultists is due to their ability to inspire hope. All that they do can be better done by trained physicians. There is nothing mysterious in scientific psychotherapy. Every physician consciously or unconsciously uses it in his practice. It consists in finding out what is going on in the patient's mind and relieving it by rational explanation and encouragement based on accurate diagnosis. Psychotherapy should supplement and not displace other recognized forms of treatment. Scientific minds will respond to scientific methods, but child minds can be reached only by methods suited to their limitations.

Dauwe, F. NEURASTHENIA. [Arch. Méd. belges, Dec., 1922.]

This author states that neurasthenia is not a product of modern times. It is common to all countries, and has existed probably in all ages. Hippocrates described it, and it is evident that Galen's "hypochondria" was allied to neurasthenia and melancholia. Richelieu described the neurasthenia of Louis XIII. It is the result of the "struggle for existence," and is therefore most common in the strenu-

ous period of life—from twenty to fifty. The male sex comprises two-thirds of the cases. It is rare in infancy, but is frequently hereditary and constitutional. The mental condition is dominant, and it is often described as “psychasthenia,” characterized by anxiety, phobias, impulsive obsessions, tics, and most frequently exhaustion is the foundation of true psychasthenia. Janet regards it as an entity, but while true neurasthenia and true psychasthenia demand a special description, in practice it is very difficult to define the hereditary factor, and frequently the conditions are associated. Even in acquired neurasthenia we must accept predisposition. Nervous overwork is always its foundation. Dauwe enumerates the physical symptoms—headache, dyspepsia, etc.—and then describes the mental condition resulting from the physical state of the patient: failure of will power, of concentration, of memory; but the mental state is not that of hysteria. The psychasthenic writes out a long list of his symptoms, and returns, fearing that he has omitted one. It is not an imaginary disease—hysteria is the offspring of imagination, suggestion will cure it; neurasthenia is the product of exhaustion, suggestion cannot control it. Treatment requires all the ingenuity and knowledge of the physician. The cause must be discovered and removed. Almost all these patients love the stress which exhausts them and cannot withdraw from it because it is their means of livelihood. Stimulants or narcotics only increase the exhaustion of the nerve cell. Possibly increase or diminution of the intracranial pressure by hypertonic or hypotonic intravenous saline injections may do good. Prophylaxis may be summed up in a phrase—moderation in all things. Mental work and physical exercise should alternate. The patient should be (in the words of Henri Bordeaux) taught that life has still, for him, some mission to be fulfilled in the world; he must be warned against fruitless introspection. The healthy man is an altruist. Egoism and “egocentrism” are pathological. The egoist is not cured and cannot be.

Hartendorp, A. v. H. SOME RESULTS WITH INTELLIGENCE TESTS IN THE PHILIPPINE ISLANDS. [Philippine Journal of Science, March, 1922, XX, No. 3, pp. 287-307.]

A paper consisting of three parts, as follows: *Part One*, giving the results of the application of the Otis Group Intelligence Scale to 1,000 male and 752 female Filipino (Tagalog) teachers; *Part Two*, giving the results of the application of the same scale to a highly selected group of 166 male and 59 female teachers from all parts of the Philippines gathered in a teachers' convention at Baguio; and, *Part Three*, giving the results of the application of the Yerkes Point Scale to 146 boys and 29 girls, many of them of mixed blood, in the Provincial School of Cuyo, Palawan.

Part One. The average score for the men is 77.0 and for the

women, 70.9. The teachers come from four different Tagalog provinces, and the author seeks an explanation for the provincial differences, and also for the varying sex differences, in the average scores of the four provinces in the differing racial make-up of the people in these provinces. The writer gives attention to the influence of schooling on the scores obtained and comes to the conclusion that it is but slight even among these Filipino, but English-speaking teachers. It must be remembered that English is used in all the public schools of the Philippines. In comparing the results obtained in this group with those obtained by the army psychologists, the writer states: "The Filipino group contains comparatively few men of very superior intelligence, but a higher percentage of high average and average, and a lower percentage of inferior and very inferior. The lower end of the table may be explained by the fact that the Filipino group (being entirely composed of school teachers) was a selected one, while the United States draft group was not. On the other hand, the smaller percentage of men of very superior intelligence may be explained in part by the fact that many English-speaking Filipinos of ability do not enter the government service inasmuch as private business firms often offer more attractive salaries." The writer, however, warns against direct comparison of American and Filipino scores, saying that this "would hardly be fair, owing to the different conditions."

Part Two. In this group of selected teachers, the average score for the men is 122.0 and for the women, 115.0. These are divided into various racial groups—Malay, Spanish-mestizo, Indonesian, Proto-Malay, and Chinese-mestizo—"not so much to indicate the relative intelligence of these Philippine racial types, as to show that each type contains individuals of high mental ability."

Part Three. The data for this group are admittedly meager. Cuyo is a small island in the Sulu Sea, and the people are in-bred to a considerable degree. The writer finds that the pure-blooded Cuyono children score much lower than those whose blood is mixed with American, Spanish, Chinese, and Tagalog blood. "The results are rather striking," says the writer, "but the insufficiency of the data does not allow of many generalizations. It may be said, however, with little chance of error, that the in-bred Cuyono strain is enriched by intermixture with outside blood."

The whole study is an interesting attempt to correlate psychological with ethnological data. [Author's abstract.]

Levi, L. MENTAL ANOREXIA AND THE THYROID. [Encéphale, Oct., 1922, XVII, No. 8.]

This observer points out some kind of relationship between anorexia and thyroid action. Thyroid treatment caused the appetite to return and the three cases reported gained in weight. Absence of appetite from thyroid insufficiency was the diagnosis. On this had

become superposed a mental condition aggravating the anorexia and perpetuating it; a pathoneurosis as Ferenczi has called this mixture of somatic and psychogenic components.

Jacobson, Edmund. CHRISTIAN SCIENCE FROM A MEDICAL STANDPOINT. [Ill. Med. J., Dec., 1922.]

The purpose of this article is to make the real character of Christian Science as a "system of medicine" better known to the average physician. Mrs. Eddy evidently got her ideas from three chief sources: (1) The scriptures; (2) her personal experience with a certain nervous disorder, for which she at first consulted a "mental healer," but later treated herself; (3) from a misunderstanding of Greek philosophy. In her book entitled "Retrospection and Introspection," she mentions Plato and the Neo-Platonic school, and this indicates that she tried to understand these writers. As every student of philosophy knows, the Greeks considered matter as nonexistent, and identified it with moral evil. Mrs. Eddy copies this and other doctrines of the Greeks in an unmistakable way, but she does not admit it. She misunderstands the Greeks, but she talks to a public that knows no philosophy, and presents her doctrines so obscurely and with so many religious terms that few persons have taken the pains to penetrate its absurdities. Mrs. Eddy's text called "Science and Health" was first published in 1875, and is the gospel of authority for the "Scientist." Most of the quotations that follow are from the latest edition of this work. The essence of what Mrs. Eddy teaches can be stated in a paragraph: "All that God hath made is good, and he made all. Hence evil is not made and is not real." (311) "Suffering, sinning, dying beliefs are unreal." (76) ". . . Error, sin, sickness, disease, death—is the false testimony of false material sense." Mrs. Eddy not alone denies the existence of disease but also considers everything else in our daily world an illusion. Physicians "are ignorant that the human mind and body are myths" (150). "Flowers, landscapes, men and women are products of the so-called mind, are images which simulate mind, life and intelligence" (71). "Sound is a mental impression made on mortal belief. The ear does not really hear" (213). "Matter is not actual" (110). "Mortal existence is a dream . . ." (188). From all this it follows that "what is termed disease does not exist" (188). "You say a boil is painful; but that is impossible, for matter without mind is not painful. The boil simply manifests, through inflammation and swelling, a belief in pain, and this belief is called a boil. Now administer mentally to your patient a high attenuation of truth, and it will soon cure the boil" (153). "It is erroneous to believe in the real existence of a tumor, a cancer, or decayed lungs" (395). "If a person swallows poison through mistake and dies, does human belief cause that death? Yes" (177). "A child may have worms if you say so" (413). Mrs. Eddy not alone criticises

the practice of medicine, but also is opposed to principles of hygiene. She argues against sanitation (175), exercise and cold baths (220, 413), and diet (222, 388). Treatment by Christian Science consists in making the patient see the Truth. Mrs. Eddy claims that she "has cured what is termed organic diseases as readily as she has cured purely functional disease" (149). She states that "God impelled me to set a price on my instruction. The amount was three hundred dollars. I shrank from asking it, but was finally led, by a strange providence, to accept this free" (from *Retrospection and Introspection*").

The psychologic workings of Christian Science are apparent. In testimonial meetings, the presence of religious or "mass" suggestion is evident. Other factors of influence clearly are the quiet and contentment that the faith may bring, and the intellectual and emotional diversion from symptoms derived from preoccupation with religious matters. The lay public, when it credits Christian Science with innumerable cures, fails to take into account sundry facts. (1) Christian Scientists often remain ill, but are trained to deny it. (2) Many individuals with imaginary ailments may cease to imagine, and claim a "cure". (3) Laymen cannot diagnose accurately or tell when they are cured. (4) Many ailments run their natural course and disappear, and the result is wrongly ascribed to Christian Science. (5) Christian Science may get credit for false cures just as any well advertised patent medicine gets credit from a large following. (6) The testimonials of Christian Scientists generally are subjective reports. Laboratory tests are lacking. Such testimonials have no scientific value. The average physician probably does not realize how much harm Christian Science is doing. It leads toward dangerous neglect of drugs, surgery and hygiene. An example was a recent autopsy at County Hospital, following a dinner with fungi mistaken for mushrooms. The dead individual was a Christian Scientist who had refused to undergo the catharsis that saved other members of the family who ate the poison. The use of Christian Science in functional nervous disorders is particularly to be condemned, since it cultivates a state of delusion, in which the realities of the external world are denied, reminding one of the delusions which the insane are said to create in preference to the stern and disagreeable generalities of life. In short, it cultivates intellectual degeneration. From the progress of Christian Science among the laity, several morals may be drawn: (1) There is need of increased study of experimental psychology applied to medicine. (2) Medical men generally should take greater interest in community concerns. Every effort should be made to increase the general medical competency, to avert inadequate medical preparation, and to weed out quackery and cults. (3) Accounts of advances in medicine and surgery should be conveyed to the public by lectures and articles. The public has the right to be educated. [Author's abstract.]

Roheim. PSYCHOANALYSIS AND THE FOLK TALE. [Int. Journal of Psycho-Analysis, III, 180.]

Bartlett (*Folk Lore*, 1920, 264) questions two essential viewpoints of Freudian publications on the folk tale. It is quite easy to prove the first, *viz.*, that the folk tale is a wish fulfillment of an erotic nature, for the hero regularly obtains the object of his desires, the heroine. As to symbolism Bartlett, like the general public, does not seem to grasp that a symbol is a substitute in consciousness for an unconscious content and hence his curious remark that he knew all the folk tales mentioned by Riklin in his book as a child, and never dreamt of finding anything symbolic in them. Bartlett acknowledges that the value of Freud's work on dreams consists in the fact "that what at first tends to appear a mere muddled mass may be shown to illustrate the most perfectly determined order." Psychoanalysis can do the same for the folk tale. To show this the tale called the "Three golden hairs of the devil" is analyzed. The hero has certain questions to ask and the devil gives him the answer. The questions are all symbolic repetitions of the child's one great question, "Where did I come from? How are children made?" The infantile hero is hidden under the bed by the devil's mother or wife and gets the answers he desires by eavesdropping. Listening to the conversation of the adults on forbidden subjects is a substitute for voyeurism, *i.e.*, observing the coitus of father and mother. This original scene leaves a lasting impression on the child's mind that often survives in dream life and therefore we find that the questions appear as things dreamt of not by the child but by the mother (projection). The omniscient supernatural personage of the tale is really the father transformed into a devil by the boy's Oedipus attitude. The jealous observation of paternal coitus by the male child is an ontogenetic repetition of the phylogenetic Oedipus conflict, of actual parricide (castration of the father) and intercourse with the mother. After every question one of the devil's "golden hairs" (penis symbol) is pulled out and the tale ends by the father actually taking the place of the devil or one of his duplicates. Nevertheless, we must not believe that after the unconscious content of a tale has been demonstrated there are no problems to be dealt with. There are still the questions of historical origins and migrations which must be solved by the aid of anthropological and historical research. [Author's abstract.]

Smith, G. Elliot. THE OLD AND NEW PHRENOLOGY. [Editorial, British Medical Journal, Feb. 3, 1923.]

The Henderson Trust of the University of Edinburgh was founded by William Ramsay Henderson, who believed that in phrenology there was an unexplored and interesting field for scientific research. He died in 1832, and his trustees have endowed research in the structure and functions of the nervous system, and have encouraged the excel

lent work on the anthropometric survey of Scotland. A lecture under the auspices of the Trust was given at the University of Edinburgh on January 26th by Dr. G. Elliot Smith, F.R.S., Professor of Anatomy at University College, London. He began by praising the action of the Henderson Trust, and expressed the opinion that the investigations it was promoting were bound to lead to valuable results such as the founder of the Trust clearly contemplated when he made his bequest. The subject of Professor Elliot Smith's lecture was the old phrenology and the new; he observed that though Dr. F. J. Gall did not use the term "phrenology," he was responsible for inaugurating the remarkable doctrine to which the word was applied by his collaborator, Spurzheim, a century ago. In the light of recently acquired knowledge we were in a position to appreciate the far-reaching influence of Gall's work upon the interpretation of the anatomy and physiology of the brain, and to judge of its worth in a more dispassionate manner than was possible in the nineteenth century, when the mere mention of phrenology was enough to raise violent gusts of controversy. If Gall's actual writings—and not merely what other people attributed to him—were studied, and due attention paid to the befogged state of knowledge and opinion regarding the nervous system when his work was done, it had to be admitted that posterity had failed to give any adequate general recognition to the importance of his positive contributions to the knowledge of brain anatomy, and to the great influence his work effected in clearing away much that was nebulous, and even fatuous, in physiological theory and psychological speculation. He inaugurated the new era of cerebral localization and identified the area of the left side of the cerebrum, injury to which caused a loss of speech or inability to name things. If he was led into error in working out the details of his applications of the principles of localization, the psychological doctrines which then prevailed were to blame rather than Gall himself. The lecturer then proceeded to examine the factors that determined the variations in the relative development of the different parts of the brain, and the dominant influence of the brain in determining the size and shape of the skull. He showed from skulls that the development of the brain from the lowest stages to that of modern man was chiefly in the frontal region. An examination of the skulls of famous musicians had shown that there was a distinct area of abnormal development above the ear and that the frontal development was sometimes below the average. In ancient Egypt the religious revolution of Akhenaton was connected with the peculiar physical type of that famous Pharaoh, Egypt lost her empire, and when she recovered her strength in the nineteenth dynasty the great Pharaohs were found to have very strong faces, and well developed skulls. To illustrate this point the lecturer showed a picture of Seti the Great, to whose tomb the Tutankhamen relics, recently unearthed, are being carried. Studies he had made when in

Egypt afforded evidence that the weakness of the twentieth dynasty was accompanied by peculiarities in the skulls of the late Rameses Pharaohs.

Culpin, Millais. THE NOMENCLATURE OF MINOR MENTAL DISORDERS. [Journ. of Neur. and Psychopath., August, 1922, p. 105.]

In this contribution the author criticizes the prevalent loose use of the terms "neurosis" and "neurasthenia." After quoting the definition of "neurosis" in the *Oxford English Dictionary*, he shows that the word has been employed by distinguished writers in the eighteenth and nineteenth centuries to describe definite organic disease, and as late as 1874 Maudsley refers to insanity and epilepsy as "neuroses." Culpin claims that, speaking generally, functional nervous disorders are mental disorders. "Our own meaningless use of words with meanings has taught our patients to speak of their nerves with the same satisfaction with which our ancestors talked of 'rheums' and 'humors.'" He observes that "the source of greatest offense to accuracy of thought is 'neurasthenia.' It has now become only a thought-saving device, and covers any disturbance of mental processes that is not insanity or a glaring hysteria." It connotes a pathology vague and indeterminate but influential. He agrees with Rows that we should cease trying to classify certain cases as epilepsy or hysteria and be content to describe them as "convulsive seizures." We must avoid diagnostic words that give a false sense of knowledge. Culpin proposes to limit the term "neurosis" to such a derangement of the intrinsic function of nerve tissue as is exemplified by D.A.H. "Psychosis" is usually applied to insanity, but some authorities have used it to denote minor disturbances—for example, H. Head uses "functional psychosis" as an alternative to "shell shock." Culpin suggests that the term "minor psychoses" may be used to indicate "functional nervous disorders," and under the heading "Conditions found in the minor psychoses" the author groups: (1) hysteria, (2) anxiety states, (3) obsessional states, (4) hypochondria, (5) psychasthenia, with (6) neurasthenia, which latter he and Ernest Jones have found actually present in only 1 per cent of a series of cases. Such a word as "neurasthenia" is as powerful as it is pernicious—such phrases have been a real hindrance to treatment. By using words implying a pathology which may be, and probably is, false we hinder a healthy confession of ignorance or an acknowledgment of the difficulty of the subject. [B. M. J.]

Miller, H. C. PSYCHO-ANALYSIS AND THE SCHOOL. [Mental Hygiene, January, 1923, VII, No. 1, p. 32.]

The child in reality educates himself, and is not passively educated. However, he can educate himself adequately only under proper environmental conditions as regards both material and psychologic factors. It is here that analytic psychology is of value. Analysis should not be regarded merely as a method of treating functional nervous disorders.

Like fresh air, "Its real value is preventive, its application should be universal, its propaganda should be in the hands, not of doctors only, but of all who have charge of the young." The teacher can do more than the physician to prevent the occurrence of neuroses and maladjustments. The teacher must know, not only his subject, but also the child, and himself, and must be able to observe analytically. However, he should not direct the analytic interest of the child upon his own mental processes, but should merely judge the necessity for analytic treatment and refer the child to an experienced analyst for actual treatment. He must particularly avoid jumping at conclusions on insufficient evidence, and postulating motives and mechanisms which are analytically probable but cannot be definitely demonstrated.

A further factor in the success of the teacher is his own fundamental temperament. No psychologic training will render him a good teacher if he is temperamentally unequipped for this vocation. His own repressions may prevent him from understanding his pupils, or may color his judgment of them. This is fatal to effective analytic education. The teacher may be unaware of his own mental astigmatism until analytic tests are made. While his own reactions toward the world are distorted he cannot guide the child, or even interpret him correctly. This applies particularly to the problem of discipline. The adolescent is engaged in making a difficult adjustment between his own individuality and the herd obligation and authority. Neither rigid training-ship methods nor visionary evasion of the problem by ignoring its existence will teach the child true discipline. It is the teacher who must find the method of approach to the child's own sense of social demand. A teacher who is himself a social rebel, impatient of social authority, will never succeed in teaching his pupils a satisfactory basis of adjustment to environmental demands. The teacher may require psychoanalytic treatment before he is fitted to come in contact with impressionable minds.

A further hindrance to efficient training is the "sense of status" on the part of the teacher. No vital contact with the children is possible as long as the teacher is self-consciously aware that he is an adult and therefore set apart from his immature charges. The child is quick to sense the attitude of patronage, and meets it by a passive resistance which closes the path to mutual understanding. On the part of the teacher himself it leads to traditionalism of the worst sort, in the attempt to force the child to think along adult lines, instead of helping him to work out his own logical reactions. The teacher should recognize that the child is his inferior only so far as logical processes and factors of experience are concerned, and that on the unconscious plane, in matters of intuition, creation, and art, he may be in a position to lead, and not to be guided. There is a close relation between character and intellect. Psychoanalysis, by clarifying character reactions, will further

the intellectual growth as well. Education is most concerned with character, as fitting the individual for his place in the social cosmos. Attention to normal reactions during the school period will prevent the appearance of later maladjustments and neuroses.

Kirstein. LABOUR UNDER HYPNOSIS. [Zentralbl. f. Gynäk., May 27, 1922.]

A series of experiments have been carried out in the Heidelberg clinic in which patients in labor are hypnotized during the early stages and suggestions are made during three or four preliminary attendances at the clinic. Von Oettingen had two failures among 16 labors; Schultze-Rhonhof, 8 among 77. The writer endeavored to modify the technique so as to make it less exacting for the physician; in the preparatory sittings the suggestion was impressed that the patient, after being hypnotized by the physician, would sleep through a painless labor and would only awake on receiving the command to do so from the doctor at a time when birth had been accomplished. The nurse was instructed to reinforce these suggestions, should the patient prove restless, by application of an empty ether mask and by saying, "Go on sleeping quietly until the doctor comes and wakes you." In 14 out of 22 cases this method led to satisfactory results, the conduct of labor being left to the nurse, and the patient being awakened by the doctor at his routine visit, which took place in several instances on the day following the birth. The writer speaks favorably of combination of hypnosis with narcosis, as recommended by Friedländer: the nurse is authorized to administer 3 to 5 drops of chloroform during each pain. The case is recorded of a vaginal Cæsarean section performed for valvular disease of the heart with failing compensation and bronchitis; during the operation, which lasted 110 minutes, the patient, after initial induction of hypnosis, received 70 c.cm. of ether; she replied to questions but was not restless, and no recollection of the operation was subsequently preserved.

Campbell, Macfie. THE PSYCHONEUROSES. PROBLEMS AND LINES OF INVESTIGATION. [The American Journal of Psychiatry, January, 1923, II, No. 3, p. 367.]

In the large group of psychoneurotic patients, the main emphasis should not be laid upon the same factors in all of the cases. It is important for the physician always to keep in mind the numerous and diverse factors upon which the efficiency of the individual depends. It depends upon: (1) The functional efficiency of the various systems of the body, cardiovascular, respiratory, etc., and among these systems two have a very special importance, the central nervous system and the endocrine system; defects in the other systems being compensated for more or less in a variety of ways, while any inferiority in the endocrine or central nervous system strikes in a very fundamental way at the behavior

of the individual; (2) The constitutional equipment of the patient in respect to (a) the crude fundamental emotional reactions, (b) more delicate and less easily classified reactions involved in the personality; (3) The special experiences which may have sensitized the individual to special topics or situations (as in the "conditioned reflex"); (4) Physiological factors in relation to the mode of life of the patient, *e.g.*, involving excessive work with consequent fatigue, alcoholism, etc.; (5) The actual life situation and its relation to the constitution of the patient, *e.g.*, an unsuitable marriage, distasteful occupation, uncongenial social environment, may play an important rôle in the failure of the individual to maintain a healthy balance.

In the formulation of each case one must take into account the possibility of a disorder at each of these various levels. It will not do to allow our patient to drink himself to death while we are patiently analyzing the roots of his alcoholism, nor is it adequate as a rule merely to make the environment dry while we pay no attention to the fundamental cravings and dissatisfactions which express themselves in this way. While due regard should be given to somatic defects, it is important to be on our guard against the exaggerated overemphasis on certain topics which may be due to the vogue of one or other conception, such as eyestrain, uric acid, focal infection, or endocrinopathy.

Aubriot, P. PARATHESIA IN OTORHINOLARYNGOLOGY. [Bull. Méd., Nov. 25, 1922, XXXVI, No. 48.]

Such phenomena as Aubriot analyzes may be either illusions derived from minimal anatomic lesions, or hallucinations. In both cases there is no proportion between the stimulus and the psychic reaction. The patients are usually very eloquent. The most common complaints are the feeling of a foreign body, dryness, phlegm, burning, and constriction. A careful examination is necessary to eliminate organic lesions like the chronic deep tonsillitis, tuberculous and syphilitic lesions near the tubes.

Mohr, F. PSYCHOPHYSICAL RELATIONS IN INTERNAL MEDICINE. [Med. Klinik., Dec. 24, 1922, XVIII, No. 52.]

This author states that not enough attention is paid to the fact that every somatic disturbance necessarily is accompanied by psychic factors, and that psychical factors accompany somatic disturbances.

Strecker, Edward A. PHYSICAL FINDINGS IN THE PSYCHONEUROSES. [Am. Arch. of Neur. and Psych., Vol. VI, pp. 197-200.]

The author comments on the importance and frequency of the organic morbidity in the psychoneuroses. Of 260 patients examined at the Neuropsychiatric Clinic of the Pennsylvania Hospital presenting clear cut diagnostic evidence of psychoneurotic states, 120 or 46 1/10 per cent revealed serious and significant somatic pathology. Given in the order of frequency there was discovered: endocrine dysfunction, tuberculosis

(including the pulmonic, intestinal and glandular varieties), syphilis, extensive apical abscesses, organic heart disease usually with beginning decompensation, post-influenzal states, arteriosclerosis, anemia, combined heart and kidney disease, osteoarthritis, sinusitis, infected tonsils, extreme visceroptosis, infected pelvic structures, chronic Neisserian infection, nephritis, chronic appendicitis, suppurative otitis media, prostatitis, gastric and duodenal ulcer, beginning gastric carcinoma, lead poisoning, floating kidney and diabetes. There were nineteen instances of ductless gland disturbances, involving the thyroid, pituitary, and suprarenal glands; eighteen cases of tuberculosis, and fifteen patients with syphilis. Of the entire 120 cases 85 were symptomatically expressed as neurasthenia, 20 as psychasthenia, twelve as hysteria, and three as anxiety neuroses. In the midst of the great number of conflicting theories concerning the possible etiology of the psychoneuroses, it is necessary to keep an open mind and to continue to study intensively the individual patient rather than be tempted into sweeping generalities. Probably one is not justified in assuming a direct causal relationship between the physical disease and the neurosis, but neither is it permissible to dismiss obvious pathology as merely incidental and inconsequential. Both the rigid organicists and those who adhere strictly to psychogenetic point of view find it necessary to supply conjectural premises and theoretical intermediate stages. There is still considerable virtue in thinking of a psychoneurosis as a nonspecific reaction. Proceeding from such an hypothesis the neurologist will be less likely to be satisfied with inadequate examinations and consequently will not be led into the error of overlooking etiologic possibilities and promising avenues of therapeutic approach. [Author's abstract.]

Camus, J. EXTRACORTICAL REGULATORY AND PSYCHIC CENTERS. [Médecine, February, 1923. J. A. M. A.]

Camus defends his old opinion that psychic functions have extracortical regulating centers. This accounts, among other things, for the undeniable rhythms of psychic action. He quotes Ballet who considered the circular psychosis only as an enormous exaggeration of normal conditions. In his experimental work with Roussy on the centers at the base of the brain that cause diabetes insipidus, obesity, glycosuria and genital atrophy, he observed frequently marked excitation of the animals without signs of pain. The psychic changes in encephalitis point also to this extracortical localization.

Harford, C. F. PHYSIOLOGY AND PSYCHOLOGY. [Correspondence B. M. D., 1923, p. 789.]

Sir,—In your issue of April 14th Dr. Berry was good enough to refer to a letter of mine published by you on December 30, 1922. I mentioned there the presidential address of Sir Charles Sherrington, P.R.S., to the British Association, in which he discussed the action

of mind upon bodily mechanism. My allusion to this address was in general terms, and in order to avoid any possible misconception I will, with your permission, quote certain passages from the address which will make the matter clear. I desire to do so as I feel that Sir Charles Sherrington has indicated with high authority and with remarkable lucidity the relations of physiology and psychology which it is of great importance that all should recognize. He said:

"I do not want, and do not need, to stress our inability at present to deal with mental actions in terms of nervous actions."

Then, after a most interesting account of the resemblances between the "mental" and the "nervous," he said:

"Yet all this similarity does but render more succinct the old enigma as to the nexus between nervous impulse and mental event. . . . The nexus between the two sets of events is strict. But for comprehension of its nature we still require, it seems, comprehension of the unsolved mystery of the how of life itself. A shadowy bridge between them may lie perhaps in the reflection that for the observer himself the physical phenomena he observes are in the last resort psychical."

One more quotation may be given:

"It is to the psychologist that we must turn to learn in full the contribution made to the integration of the animal individual by mind."

These are generous words from a distinguished physiologist, and it would be well if the whole address could be widely studied. A summary of it appeared in the *British Medical Journal* for September 9, 1922, but every line of it is of interest. Dr. Berry, I am sure, would rejoice in this presentation of the case from the side of physiology, and I doubt not that he would follow the lead of the President of the Royal Society in according to the students of psychology their rightful place in dealing with the problems of life. This is all we ask. We were all of us physiologists before we became psychologists, and it is of vital importance that these two branches of research should work in the closest coöperation.

Dr. Berry may be sure, if I may be allowed to say so, that readers of the *British Medical Journal* highly value the breezes which come from the "outposts of empire." If some criticisms of his letter have erred on the side of frankness he will perhaps regard it as evidence of the brotherly spirit—I am, etc.

Barker, L. F. NEUROPSYCHIATRIST AND STUDY OF A PERSON AS A WHOLE. [N. Y. State J. of Med., November, 1922, XXII, No. 11. J. A. M. A.]

The knowledge and technic necessary for the thorough study of a (psychophysical) person, as a whole, Barker says, has become so complex that it is now beyond the power of a single physician to attain to mastery of all parts of it. The complete analytic and synthetic study

of a person, a psychophysical individual, by modern clinical methods demands (1) examinations by experts in the study of the several component bodily systems (respiratory, circulatory, digestive, urogenital locomotor, neural, endocrine); (2) technical studies of the biography with special reference to the assets and deficiencies of the associated personality, and (3) an integration of the results of the various examinations into a diagnostic whole that is properly coördinated and subordinated. By such a thorough survey only can the modes of reaction of the phenotype or "realized person" be as satisfactorily recognized and the hereditary and environmental factors be as fully appreciated as the present state of clinical knowledge and technic make possible. When the results obtained through the examinations of internists, of various medical and surgical specialists, of neurologists and psychiatrists have been collected and arranged, the data can then be critically examined with reference both to the endogenous and the exogenous factors that have been responsible for the production of the special phenotype (or realized person) that the patient represents. It should then be possible to plan a therapy that will pay due attention to the physical, chemical, psychic and situational measures that will most favorably modify the person in the direction of adequate adaptability. In the present state of diagnosis, the knowledge we can gain of a person as a whole is but fragmentary, but we shall work with greater confidence if we are sure that our studies are properly directed.

Bates, R. L. EFFECTS OF SMOKING ON FUNCTION. [Jl. of Comp. Psych., October, 1922, II, No. 5.]

This experimental work was done with six individuals, under varying conditions, using the method employed by Carver in his observation of the effect of smoking on the accuracy of throwing darts at a target. As to the effect on the actual distribution of darts, in every case but one, the variation was less for the smoking days. The distribution was more uniform—less scattering—after smoking. The analysis of the quadrants of the target in respect to daily differences and differences in the progressive sets of the hour was likewise productive of negative results.

BOOK REVIEWS

Wohlgemuth, A. A CRITICAL EXAMINATION OF PSYCHO-ANALYSIS. [The Macmillan Company, New York.]

The reviewer lays this book down with mixed feelings; in fact before completing it he laid it down several times with mixed feelings of irritation and amusement. It makes such a noble impression from the publisher's attention and starts off with such naïve rationalizations about lack of bias, and fair examination, and careful study, etc., that one is inclined to believe one is going to find a real intelligent criticism and get some useful ideas about all this pother of pro and con which has characterized the psychoanalytic movement now for nearly twenty years.

Yet the Goethe quotation on the first page gives the whole show away and further examination reveals the author, so far as the subject matter of this criticism is concerned, as a careless reader, a thoroughly superficial person with such stupid emotional resistances that he sinks to the grossest forms of misinterpretation and the silliest forms of illogical presentation of his subject matter.

He makes a great show of learning and an even greater one of misapplying it, for his "Criticism" shows a vast amount of lack of understanding of what he is writing about.

In short there is not a scintilla of evidence to show that Wohlgemuth has ever attempted to apply any of the principles of psychoanalysis. Some years ago he read some books about it, condemned it as rubbish, and maintained this superficial attitude even when after some years rereading some more books he felt some slight doubt about his previously formed judgments. The book, for us, hardly merits this amount of space for its consideration, even though Flügel has treated it quite seriously.

In the many intervals of its reading the reviewer took refuge in a most pleasing and scholarly exposé and criticism of the writings of Ernst Mach by Bouvier, and cannot repress the suggestion to the author of this biased condemnation to do likewise and learn somewhat of how a serious contributor to science should be dealt with.

de Quervain, F. GOITER. Translated by J. SNOWMAN, M.D., F.R.C.P. [William Wood and Co., New York. \$6.00.]

The problem of goiter has been studied by the author, a surgeon at Bern for a number of years. This work is a résumé of a number of these researches and is chiefly devoted to surgical considerations of the thyroid gland, with reference to its hyperplastic, hypoplastic and neoplastic modifications.

It is a very scholarly presentation of the various mechanistic considerations which have reigned in general pathology and as such

is most commendable. It advances the surgical technical considerations greatly but does not really offer a philosophical insight into the medical problems of the diseased organ. Beyond vague auto-intoxication humoral absurdities causation receives no penetrating discussion.

Lévy-Bruhl, Lucien. *PRIMITIVE MENTALITY.* Authorized Translation by Lilian A. Clare. [The Macmillan Company, New York.]

The author's earlier volume on "mental functioning among primitive peoples" has been well known and authoritative in certain anthropological circles for a number of years. The present volume, exceedingly well translated, is in a sense a continuation of the previous study, but it dovetails into it in such an intimate manner that one who has not read his earlier volume will not suffer materially in his comprehension of this one.

Both of these volumes should be read by the neuropsychiatrist even if the phenomenology alone be the manifest content of the author's message.

It is a better descriptive ethnology and anthropology than that of its predecessors, even if it does not penetrate much beyond an empathy into the magic stage of primitive mentality. Even this empathy constitutes a great advance into the understanding of the phylogenesis of human mentality, a subject still too naïvely conceived of in orthodox university psychology.

When the reel unwinds backwards as it does in the psychoneuroses and psychoses, in day dreaming, phantasy formation, rationalizations, dreams and minor psychopathological phenomena, much of this material reappears and is called bizarre or crazy or what not by those who do not understand it. Even though Lévy-Bruhl does not get behind the phenomena as satisfactorily as does the psychoanalytic technic yet his work is of outstanding interest and value to every serious student of mental phenomena.

Coulter, Merle C. *OUTLINES OF GENETICS.* [University of Chicago Press.]

In no scientific field has the experimental study of evolution been more active nor more valuable than in that of botany. Erasmus Darwin Goethe began there and Mendel's intuitive genius drew its inspiration in this field. The simplest and yet most striking examples are to be found here and hence for a student of genetics the best beginning can be made here.

This small book by a botanist develops the main situations which have come chiefly out of the studies of Mendel in a very clear and orderly manner and it can be most cordially recommended to one who would acquire the rudiments of this new science of genetics.

Ross, T. A. *THE COMMON NEUROSES. THEIR TREATMENT BY PSYCHOTHERAPY.* [Longmans, Green & Co., New York.]

At the outset the reviewer would state that this is in general an exceptionally good book. The author is conversant with the general

history of the development of psychotherapy—not very deeply versed, but in the common sense manner of a humanist and sincere medical practitioner. He is not altogether happy in his citations of preferred authorities since he is unaware of propaganda undercurrents in some upon whom he would lean, but in the main he can be read with profit.

We feel that Ross will go much further than his more or less rough and ready approach to the problems here presented would indicate. If the time should ever arrive when he would outline a real comprehension of theory in its causal logic to the understanding of the neuroses his present attitude will, we think, appear quite unsatisfactory.

We can sympathize with his difficulties in formulating a satisfactory hypothesis, though he is apparently not aware of this difficulty, *i.e.*, logically, and can go with him into his practice and gladly. Just as theoretically it might be a jolly achievement to kill off all the tubercle bacilli in a tuberculous lung; practically one must do the best one can—so why bother about a group of studies having the “theory” in view. So in the neuroses and psychoneuroses why bother trying to obtain fundamental conceptions since they may prove as difficult of application as in the tuberculous immunity efforts, etc.

In other words, Ross would stand pat with the mass of honest effort to do something for his patients—in which we cordially follow him, but we cannot feel that he has really gone into the “innards” of the perplexing problems. If one were inclined to be sententious one might say Ross dodges difficult situations in his rough and ready optimism. We seriously doubt his ideas are of any real practical value in curing a difficult compulsion neurosis and his discussion of the cyclothymic situation is quite inadequate.

To repeat, Ross has written a useful book even if we conceive of his thinking as quite contradictory.

Raimann, Emil. ZUR PSYCHOANALYSE. [Urban u. Schwarzenberg, Berlin, Vienna.]

A short monograph composed of two lectures almost entirely made up of misconceptions and superficial judgments of Freud's conceptions. So far as the reviewer can learn there is little here that can be of help since the general libido theory is totally outside of the author's comprehension.

von Böhm, Gottfried. LUDWIG II, KÖNIG VON BAYERN. SEIN LEBEN UND SEINE ZEIT. [Verlag Hans Robert Engelmann, Berlin.]

The tragic fate of the House of Wittelsbach offers but few parallels in the history of reigning families. The generation of Ludwig II has nearly passed and few witnesses of his personal life are still alive. The author was one of those who saw service in the Bavarian royal house and now at the end of a long life he presents an appreciative study of this most interesting personality. Ludwig's life, his

tragic death with v. Gudden, and the equally sad story of the two last members of the reigning family were matters of active interest among us some forty years ago.

This biography is full and well documented and constitutes an important addition to the many studies of the life of this monarch. It is particularly rich in material bearing upon his friendship with Wagner and his interests in music, art, literature, the drama, architecture, etc. We obtain a deep impression of this extraordinary personality—with much question concerning what has been termed his mental disease, for von Böhm would present the facts from quite a different angle from that which has been more prominent in the numerous pathographies.

We have not the space to devote a long review to this most fascinating volume. We believe it will be read with much interest and profit.

Starling, Ernest H. *THE ACTION OF ALCOHOL ON MAN.* With additional matter by R. Hutchinson, F. W. Mott and R. Pearl. [Longmans, Green and Company, New York, London.]

Starling, who is widely known and universally acclaimed as an authoritative physiologist, has written a work to represent the present day platform of knowledge concerning the action of alcohol upon human function and structure. In addition to the experience garnered in his own field he has had the assistance of others also of acknowledged ability to express their opinions upon other aspects of the action of this subject of interest to all.

The author first discusses the subject of fermentation and the formation of alcohol. Then what happens to it chemically when taken into the human body. Alcohol as food, and the relationships of foods, drugs and poisons are discussed.

A chapter on Alcohol in Human Behavior is next given. Here we find the facts as they are conceived in the light of the psychology of the unconscious. Alcohol is not a stimulant. It modifies many suppressions more or less of evanescent growth and permits older biological reactions of the individual's personality to appear. Thus it first affects higher level mechanisms and plays an enormous rôle in the function of sociability.

Similarly the chapters on fatigue and alcohol, alcohol and digestion and blood circulation, etc., and those following are careful and adequate statements of the actions of this important substance on these various systems.

Nowhere have we read as sane and sensible a volume upon this subject from all points of view.

Fazzini, Serafino. *CARATTERE E SESSUALITA. PROBLEMI DI BIOLOGIA.* [Liberia di Scienze e Lettere, Roma.]

An interesting monograph on male and female characteristics, their physical and psychical foundations and modes of estimating what may be eugenic matings and hoped for happy marriages. The story is presented in a series of semi-aphoristic paragraphs collected

in a few chapters. Harmony and Equilibrium, chapter one, would sketch cosmic harmony, physico-chemical equilibrium, biological harmony. Male and female harmony and deviations therefrom are discussed in a second and third chapter, a little too much from the standpoint of absolutes.

Interesting but not at all convincing, since nature's rich diversity cannot be generalized within the narrower classifications here suggested.

Hirt, Walter. *DIE ENTSCHEIUNG DER SEELE.* [Hugo Bermühler Verlag, Berlin.]

The author has a new theory of the "unveiling of the soul." This work is a popular presentation of his ideas, portions of which he has already put forth under the caption of the "unity in nature." He would make clear to the educated layman a monistic point of view concerning the perplexing problems of the soul: where did it come from, what is it, and what does it do? What is its inner structure, veiled behind the seven veils of the ancient mythologies?

His short sketch of his new theory first tells us that our perceptions are not trustworthy and our speech mechanisms lag behind in their possibilities to describe the situation. These two postulates must first be understood. These two difficulties he discusses. In the present state of our organization many stimuli react upon the human organism of which we have no conscious knowledge. This is readily granted. Speech is woefully defective and Einstein's relativity notions are applicable in this field. The analytic method is not trustworthy for a general conception. To photograph the outside of a house from the inside is a general comment on this difficulty. Hence he would essay some synthetic method, the initial stimulus for which the sophists appreciated. Democritus is mentioned and the theory of "flux" referred to. Organic world and inorganic world thus become only quantity-variable worlds. Psychical structures possess similar tension conditionings. Newton's Law thus becomes relevant for human functioning but must be split into a portion operating within the body and a part operating in the environment. These tension relationships the author claims are reducible to schemata—"Soul Figures." Through these the problems of origins (procreation), of Freedom of the Will, and of Ethics can be restated and more accurately encompassed. For Hirt, "Man is not the measure of all things" as Heraclitus taught, but the "Cosmic Laws" are these measures. Hence he would name his theory a "Cosmic Theory," in which we find only another application of "Absolutism." An interesting and very suggestive book but of extremely doubtful applicability to solve any problems of neurology or psychiatry.

Hall, G. Stanley. *LIFE AND CONFESSIONS OF A PSYCHOLOGIST.* [D. Appleton & Company, New York and London.]

In the history of American psychology there has been no greater outstanding figure than that of G. Stanley Hall, so recently gone from among us. But not, we are thankful to say, without having

left this most human document—a document of surpassing interest and value for all future generations, a source of real inspiration and a witness that a man has been among us, and a genius as well. A man in all his simple natural humanity, a genius in his insight into the needs of education and in his ingenuity in providing means for its accomplishment.

There is as little need to extol the work of Stanley Hall as to “paint the lily” and our function is accomplished in these pages when we state that no sincere student of the problems of neuropsychiatry can neglect this valuable document.

Such a one who would neglect the opportunity of making it a part of himself cripples that function of his inner development that would make him an active agent in the enrichment of human effort toward the goal of social betterment, for which Hall so nobly and effectively devoted his entire life.

Mingazzini, G. LE AFASIE. Collezione Bardi. [Librerie di Scienze e Lettere, Roma.]

This is a short monograph written for medical students and gives an excellent résumé of Mingazzini's views concerning aphasia in which he supports chiefly the classical views of Henschen as modified by his own thorough analyses.

Müller-Freienfels, Richard. DAS GEFÜHL UND WILLENSLEBEN. [Johann Ambrosius Barth, Leipzig.]

In recent years very definite changes have taken place in the modes of setting forth psychological problems. Laboratory Psychology, valuable as have been many of its teachings, has ceased to have either the vogue or the value of former generations, and more and more real living psychologies have taken the field and more or less relegated to petty scholastic classroom mental gymnastics the diminishing body of academic psychologists.

This tendency to enter into the world of actual behavior and to minimize the orthodoxies of conscious ipse dixits is strikingly shown in this very valuable work. It is a vital psychology and although not a technic for the analysis of individual problems, it nevertheless is valuable for all those who as neuropsychiatrists deal with behavioristic questions either as shown in mental illness or social disorder.

The author's discussion of the instinctive life of the individual and his place in the scheme of things, *i.e.*, his herd adjustments, coöperations and aims is most interestingly and soundly developed.

Without entering into any detail of the special trends of his exposition we can but cordially recommend it to our readers, both because of its scholarly development and its absence of petty casuistry.

NOTES AND NEWS

TENTATIVE PROGRAM

ASSOCIATION FOR RESEARCH IN NERVOUS AND MENTAL DISEASES

DECEMBER 29 AND 30, 1924

TO BE HELD AT THE HOTEL COMMODORE, NEW YORK CITY

1. Historical Résumé of the Knowledge of the Human Cerebrospinal Fluid.
Dr. Walter Timme.
2. Embryogenesis of the Human Cerebrospinal Fluid; Its Source, Circulatory Pathways, Destination, Together with Its Biological Significance in Relation to the Blood Vessels and Lymphatics. *Dr. Walter Hughson.*
3. The Normal Human Cerebrospinal Fluid; Its Cytology, Biological and Physical Properties, Together with the General Principles Governing Its Deviations from the Normal; Its Differences in Various Age Epochs.
Dr. C. Burns Craig.
4. The Human Cerebrospinal Fluid, Its Chemical and Physical Properties Under Normal and Pathological Conditions.
 - a. Examination of the Fluid from Different Loci; Cerebral and Spinal. (Reader not yet assigned.) Massachusetts General Hospital and Psychopathic Hospital.
 - b. Quantitative Chlorides. *Dr. Frank Fremont-Smith.*
 - c. Comparison of Three Colloidal Tests, Gold Chloride, Benzoin and Mastic Tests. *Jessie R. Cockrill.*
 - d. Quantitative Protein in Different Conditions. *Dr. James B. Ayer.*
 - e. Quantitative Sugar, Normal and Pathological. Correlation with Blood Sugar. *Dr. Frank Fremont-Smith.*
 - f. Electrical Conductivity of the Spinal Fluid in Health and Disease.
Dr. John L. Eckel.
5. Human Cerebrospinal Fluid Pressure Studies:
 - a. Pressure Studies, Normal and Pathological. *Dr. James B. Ayer.*
 - b. Manometric Studies of the Human Cerebrospinal Fluid in the Diagnosis of Spinal Cord Neoplasms. *Dr. Byron P. Stookey.*
 - c. Experimental Studies in Increased Intracranial and Subarachnoid Pressure. *Dr. Hubert S. Howe.*
 - d. Experimental Pressure Studies with Different Concentrations of Salts. *Dr. W. L. Aycok.*
 - e. The Increase of Cerebrospinal Fluid Pressure as a Problem on the Operating Table. *Dr. Charles H. Frazier.*
 - f. Combined Ventricular and Lumbar Punctures for the Localization of Brain Tumor. *Dr. Frank Fremont-Smith and Dr. John S. Hodgson.*

6. a. Ventriculography, Direct and Indirect. *Dr. F. C. Grant.*
 b. The Value of Lipiodal in the Localization of Spinal Lesions.
 Dr. W. J. Mixter.
7. The Bacteriology of the Pathological Human Cerebrospinal Fluid and Its Modifications in all Respects due to Bacteria, Protozoa and Other Micro-Organisms. *Dr. John A. Kolmer.*
8. The Effect of Central Nerve Changes upon the Subarachnoid Space, Choroid Plexus and Cerebrospinal Fluid. *Dr. George B. Hassin.*
9. The Reaction of the Human Cerebrospinal Fluid in Infectious Inflammatory Conditions in Cranial and Intracranial Disease. *Dr. Israel Strauss.*
10. The Human Cerebrospinal Fluid in the Extra-Neural Acute Infectious Diseases.
 Statistical tabulations from
 Dr. Oscar M. Schloss,
 Dr. Josephine B. Neal,
 Dr. Stafford McLean,
 Dr. Joseph C. Regan.
11. The Human Cerebrospinal Fluid in General System and Metabolic Diseases as in Nephritis, Diabetes, etc. *Dr. B. J. Alpers.*
12. The Human Cerebrospinal Fluid in Chronic Infectious, System and Diffuse Degenerative Diseases Involving the Nervous System. *Dr. C. A. Patten.*
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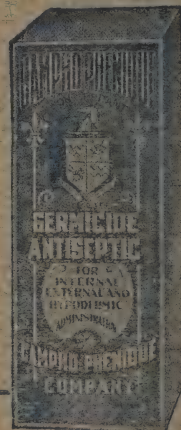
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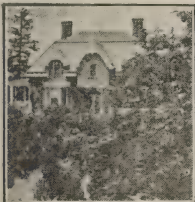
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